
Richard Ripley
Esqr.

THE NEW COMPLETE

DICTIONARY

OF

ARTS AND SCIENCES;

OR,

AN UNIVERSAL SYSTEM OF USEFUL KNOWLEDGE.

CONTAINING

A full Explanation of every ART and SCIENCE, whether LIBERAL or MECHANICAL, in which the Difficulties attending a THOROUGH KNOWLEDGE of them are clearly pointed out, and fuch Directions given as cannot fail of making their Acquifition eafy and familiar to every Capacity. Exhibiting, among the various other BRANCHES of LITERATURE, a copious Elucidation of the following, viz.

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The THEOLOGICAL, PHILOSOPHICAL, CRITICAL, and POETICAL BRANCHES,
By the Rev. ERASMUS MIDDLETON,
Lecturer of ST. BENNET's, Grace-church-Street, and of ST. HELEN's, Bifhopfgate-Street;

The MEDICINAL, CHYMICAL, and ANATOMICAL,
By WILLIAM TURNBULL, M. D.
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The MATHEMATICAL, &c.
By JOHN DAVISON,
Author of A COMPLETE COURSE OF MATHEMATICKS;

And the other Parts by GENTLEMEN of APPROVED ABILITIES in the refpective BRANCHES which they have engaged to ILLUSTRATE.

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I, Is the third vowel and ninth letter of the Engliſh alphabet: it is alſo a conſonant, and accordingly has two forms. When a conſonant, it is lengthened downwards, thus J, and pronounced not much unlike the ſoft G before *e*, as in geſture.

The letter I was derived from the old Hebrew *Jod*, and is founded by throwing the breath ſuddenly againſt the palate with a ſmall hollowing of the tongue, and the ſame opening of the lips and teeth nearly as in pronouncing A and E.

The Greeks had no J conſonant, and therefore made uſe of the I vowel inſtead of it, as ΙΗΣΟΥΣ. The Engliſh and French have two kinds of J conſonant; the firſt has a ſnuffling kind of ſound, and ſerves to modify that of the following vowels, as in *Jew*, *jolly*, &c. The latter is pronounced like the Hebrew *Jod*, which is ſounded as the conſonant *y*, as we find it ſtill among the Germans, &c. Of this we have ſome inſtances in words which are indifferently written with a *y* or *i* before a vowel, as *voiage*, *voyage*, &c.

The pronunciation of the I vowel is obſerved to be much the ſame in all nations in Europe in the Latin word *inimici*. To denote the quantity of this vowel, though it was not marked to ſhew that it was long, yet it was made bigger than the reſt, as *ÆdIlis*, *PIſo*, &c. This *i* long was pronounced like *ei*, as *divei* for *divi*, &c. Lipſius ſays that *i* was double, when it was to be ſounded long, as *dii*, *diis*, &c.

The ancients ſometimes changed *i* into *u*, as *decumus* for *decimus*, *maxumus* for *maximus*, &c. According to Plato, the vowel *i* is proper to expreſs delicate but humble things, as in this verſe in Virgil, which abounds in *i*'s, and is generally admired.

Accipiunt inimicum imbrem, rimiſque fatiſcunt.

J, in abbreviations and cyphers, ſtands for Jeſus.

I, was uſed by the ancients as a numeral, denoting 100, according to this verſe.

I. c. *Compar erit, et centum ſignificabit.*

The Greek *Iota*, and the Hebrew *Jod*, ſtand but for ten.

JACK, in mechanicks, a portable machine for raiſing great weights.

In order to explain the operation of this machine, we have given perſpective views of its ſeveral parts on *plate* XLIV. *fig.* 6, 7, 8, 9, where *fig.* 6 is the whole machine; *fig.* 7, ſhews the rack, and the pinion which carries it; *fig.* 8, diſplays the whole machinery; and *fig.* 9. the rack, ſeparately. The ſame letters refer to the ſame parts in all the four figures.

A, is a ſtrong caſe of wood, firmly bound with iron. B, the open part of the caſe in which the rack moves. C, the bottom claw of the jack, intended for raiſing weights very near the ground. D, the rack, ſeparated from the other parts of the machinery. E, the upper claw, or fork, of the jack. F, a pinion of four leaves, that moves the rack D. G, the winch or crank of the handle. H, a hook to prevent the weight, when raiſed to a ſufficient height, from falling down again, by putting the curved part of the hook round the handle. I, a large wheel, with 16 teeth. K, a pinion of four leaves, that moves the large wheel I. The power of this machine is very eaſily calculated in the following manner:

Suppoſe the winch or crank G, to be four times as long as the radius of the pinion K, then will the power of the machine in this part be as 4 to 1. But the pinion K has only four leaves, and the wheel I 16 teeth; therefore the power of the machine in this part is alſo as 4 to 1. Conſequently $4 \times 4 = 16$, is the power of both theſe parts conjointly. And as the wheel I has 16 teeth, and the pinion T, that moves the rack, only four leaves, the power of the machine in this part is alſo as 4 to 1. Conſequently the whole power of the machine is as 64 to 1: for $4 \times 4 \times 4 = 64$. If therefore we ſuppoſe a man can work at the handle with a force of 30 pounds, he will be able to raiſe a weight of 1920 pounds, ſuppoſing the machine to have no friction.

Kitchen JACK, a compound engine, where the weight is the power applied to overcome the friction of the parts, and the weight with which the ſpit is charged; and a ſteady and uniform motion is obtained by means of the fly.

JACK, in a ſhip, the flag which is hoiſted up at the ſprit-ſail top-maſt-head, or a flag-ſtaff erected on the bow-ſprit.

JACK, in falconry, denotes the male of birds of game.

JACKALL, in zoology, an animal of the dog kind, with a ſlender ſnout. It is a very beautiful creature, and ſo like a dog, as to be miſtaken at firſt ſight for ſome mungrel breed of that animal. Its ſize is that of a ſmall hound; and, in the eaſt, where it is a native, there are vaſt packs of them, often more than 200 in a company, which hunt animals they would never dare to attack ſingle. It is not impoſſible that lions and other beaſts of prey may be alarmed by the cries of theſe animals in their chace, and fall in and rob them of their prey; but the general opinion of their attendance on the lion is fabulous.

JACOB'S *Staff*, a mathematical inſtrument for taking heights and diſtances; the ſame with croſs-ſtaff.

JACOBITES, an opprobrious name given to ſuch of the Britiſh ſubjects as diſallow the late revolution in 1688 by king William III. and eſpouſe the right and intereſts of the abdicated king James II. and his line.

JACOBUS, a gold coin, ſo called from king James I. of England, in whoſe reign it was ſtruck. Of this coin there are two kinds, the old and new; the former is valued at 25s. and weighs ſix penny-weights ten grains; the

the latter, alſo called Carolus, valued at 23s. and weighs five penny-weights twenty grains.

JALAP, *Jalapium*, *Jalapa*, in medicine, a firm and ſolid root, of a wrinkled ſurface, and of a cloſe internal texture; of a blackiſh colour on the outſide, and of a duſky brown within: it is ſometimes of a roundiſh or oval, but more uſually of an oblong figure, and conſiderably thick; but we ſeldom ſee it whole, our druggiſts commonly receiving it in ſlices, which are heavy, and hard to break; of a faintiſh ſmell, and of an acrid and nauſeous taſte. The beſt jalap is that which is moſt compact and firm, and of the deepeſt brown colour within, and the moſt diſagreeable to the taſte.

Jalap was wholly unknown to the ancients; the Europeans had no knowledge of it till after the diſcovery of America. It had its name jalapium, or, as others write it, jalapa, from Xalapa, the name of a town in New Spain, in the neighbourhood of which it was diſcovered; though it is now principally brought to us from the Madeiras.

With us it is of very frequent uſe in extemporaneous preſcriptions, given in the form of boluſes and draughts. Its doſe is from 20 to 30 or 35 grains; when larger quantities are found neceſſary, it is owing to the avarice of the druggiſt or apothecary, who powder not the ſelect pieces, but ſuch as are decayed and have loſt their virtue. Its common correctives are ginger and cream of tartar; but nature has prepared it ſo well to our hands, that it indeed needs no addition. The beſt method of giving it is in a draught made with white wine, and prepared at leaſt 12 hours before the time it is to be taken; in which caſe the wine has time to open the body of the medicine, and prepare it for acting with the greater eaſe. It is an excellent purgative in dropſical and all other caſes where ſerous humours are to be evacuated. The only caution neceſſary in the uſe of it is, that it ſhould not be given in any acute fevers, nor to perſons of dry hot conſtitutions; for in theſe caſes it is liable to the ſame miſchiefs as other acrid purgatives, and will ſometimes bring on heat and inflammations in the viſcera.

JAMAICA PEPPER. See the article PIMENTA.

JAMB, or JAUMB, among carpenters, is a name given to door-poſts, and alſo to the upright poſts at the ſides of window-frames; among bricklayers, it implies the upright ſides of chimnies, from the hearth to the mantle-tree.

IAMBICK VERSES, are verſes in Greek and Latin poetry; ſo called, from their conſiſting principally of iambick feet.

IAMBUS, in ancient poetry, a ſimple foot, conſiſting of a ſhort and long ſyllable.

Epiſtle of St. JAMES, a canonical book of the New Teſtament, being the firſt of the catholick or general epiſtles; which are ſo called, as not being written to one, but to ſeveral Chriſtian churches.

JANIZARIES, an order of the Turkiſh infantry, reputed the grand ſignor's guards, and the main ſtrength of the Ottoman army.

JANSENISTS, in church hiſtory, a ſect of the Roman catholicks in France, who follow the opinions of Janſenius, biſhop of Ypres, and doctor of divinity of the univerſities of Louvain and Douay, in relation to grace and predeſtination.

JANUARY, the firſt month in the year, according to the preſent computation. It was introduced by Numa into the calendar, and placed at the winter ſolſtice, where March was before, which Romulus had placed at the vernal equinox.

The word is derived from Janus, to whom the Romans, on the firſt of this month, offered ſolemn ſacrifices.

JAPANNING, the art of varniſhing and drawing figures on wood, in the ſame manner as it is done by the natives of Japan in the E. Indies.

The method of performing this is as follows:—The wood being cloſe grained and ſmooth, keep it in ſome warm place; then take of the thickeſt ſeed-lack varniſh ſix ounces, and lamp-black enough to colour it; with this mixture waſh over your piece three times, letting it dry thoroughly each time, and again waſh it over three times more, as before: then take of the thickeſt ſeed-lack varniſh ſix ounces, Venice turpentine one ounce, and waſh your work over with this ſix times, letting it ſtand 12 hours between the three firſt varniſhes, and as many hours between the three laſt. Laſt of all, take of the fineſt ſeed-lack varniſh ſix ounces, and of lamp-black a ſufficient quantity, which mix together, and with it varniſh your work 12 times, ſtanding 12 hours between the firſt ſix and the laſt ſix waſhings. When it has ſtood to dry ſix or ſeven days, poliſh it well with tripoli and rag, till it be ſmooth; and then clear it up with oil and lamp-black; and you will have a good black japan, ſcarce at all inferior to the true.

As to the colour uſed in japanning, a common red is made of the thickeſt ſeed-lack varniſh and pure vermilion; a dark red, with fine ſanguis draconis; a pale red, with vermilion and white lead; blue, with the fineſt ſmalt; and in like manner may be done with gold colours, or any others you pleaſe.

JAR, a Hebrew month, anſwering to April and part of May with us.

JASMINUM, the jaſmine, or jaſmine-tree, in botany, a genus of plants, the leaves of which are in many ſpecies pinnated; the cup of the flower conſiſts of one leaf, but is divided at the top into five ſegments; the flower conſiſts of one leaf, is funnel-ſhaped, and divided into five ſegments: the flowers are ſucceeded by berries, which ſplit in the middle, each ſide, for the moſt part, containing a ſeparate ſeed.

The common white jaſmine is eaſily propagated by laying down the tender branches in the ſpring, which, by the ſucceeding ſpring, will be rooted ſtrong enough to be tranſplanted. They may alſo be raiſed by cuttings, which ſhould be planted in autumn in a moiſt border, where they may have the morning ſun: but they muſt be ſcreened from the violence of the ſun in the heat of the day, and frequently watered in dry weather. The cuttings, thus managed, will many of them live, and have roots fit to be removed in the following ſpring: but this method is ſeldom practiſed, the layers always making the beſt plants.

The two ſtriped ſorts ſhould be planted in a warm ſituation, eſpecially the white ſtriped; for they are much more tender than the plain, and are very ſubject to be deſtroyed by great froſts, if they are expoſed thereto: it will therefore be proper to preſerve a plant of each kind in pots, which may be removed into the green-houſe in winter, leſt, by expoſing them to the cold, they ſhould be deſtroyed, and the variety loſt.

JASPER, in natural hiſtory, a genus of ſcrupi, of a complex irregular ſtructure, of a great variety of colours, and emulating the appearance of the finer marbles, or ſemipellucid gems. The great characteriſtick of jaſpers is, that they all readily ſtrike fire with ſteel, and make not the leaſt efferveſcence with aqua-fortis. Jaſpers, though commonly reckoned among the precious ſtones, ought undoubtedly to be ranged among the ſcrupi; being only opake cryſtalline maſſes, variouſly debaſed with an earthy admixture: and to this laſt ingredient it is that they owe all their variety of colours, as white, green, red, brown, and bluiſh.

The ſeveral kinds of nephritick ſtone, and the lapis divinus or jade, are all genuine jaſpers; but the hard, bright, green jaſper, of the E. Indies, ſeems to be the true medicinal kind. It is found in maſſes of various ſizes and ſhapes, but the more uſual ſtandard as to ſize, is between four and ſix inches in diameter; but there are maſſes of it found of a foot or more in diameter, and others no larger than a horſe-bean. It is generally ſimple and unmixed; but if it be variegated at all, it is always with white, and this is diſpoſed not in ſtreaks or veins, but in clouds. It is capable of a very fine poliſh, and when the white clouds are well diſpoſed, is very beautiful, and in pieces not too thick, is tolerably pellucid, when held up againſt the light.

JAVELIN, *Haſta*, in antiquity, a ſort of ſpear, five feet and a half long; the ſhaft of which was wood, with a ſteel point.

Every ſoldier in the Roman armies had ſeven of theſe; which were very light and ſlender.

JAUNDICE, in medicine, a diſeaſe which is principally

cipally difcovered by the yellow tincture of the fkin, but moft diftinctly in the coats of the eyes, where it gives the firft notice of its invafion.

The fymptoms, according to Syddenham, are heavinefs, inactivity, laffitude of the whole body, anxiety, uneafinefs about the hypochondria, ficknefs at the ftomach, oppreffion in the breaft, difficult refpiration, a dry and harfh fkin, coftivenefs, hard white excrements, yellow high coloured urine, which will tincture linen or paper with a faffron hue: there is a bitter tafte in the mouth, and all objects feem to be difcoloured.

The immediate caufe of a jaundice, fays Towne, is an obftructed excretion of the bile from the vefica fellis and liver into the duodenum, which being forced back upon the liver, mixes with the blood, by which it is carried into the whole body, whence the fkin and urine will be tinctured with the colour of the bile. See Bile and Liver.

This obftruction may be occafioned by any thing in the duct that plugs up the paffage, or by external preffure which clofes its mouth; or by fpafm, contracting the fibres thereof. Hence we may fee why the jaundice fucceeds the flatulent colick, why pregnant women are fubject to it, and why fpafms of hypochondrical and hyfterical perfons produce the fame effect. Sudden frights, the generation of too great plenty of bile, fchirrous tumours, or ulcers of the liver, obftructions of the menfes, obftinate intermitting fevers, and the bites of venomous animals, will alfo produce this difeafe.

Hoffman thinks emeticks highly proper in the cure of a jaundice, if the difeafe does not proceed from violent anger, fpafms of the ftomach, a cardialgia, a fpafmodick colick, or a ftone lodged in the cyftick duct, exciting a violent uneafinefs about the præcordia; and that when a bilous fordes lodging in the duodenum, and clofing up the orifice of the ductus choledochus, intercepts the paffage of the bile, or when a tenacious, moveable, and not highly concreted bilious matter, plugs up the hepatick ducts, emeticks are of fingular efficacy in evacuating it. A fcruple of ipecacuanha, with a grain of tartar emetick, will be a proper dofe; or two grains of tartar emetick in a draught of generous wine, or in an infufion of manna, drinking water gruel after it.

In this cafe, Huxham, after emeticks, thinks cathar-ticks will be proper, compounded of aloeticks and mercurials. Then faponaceous attenuants, preparations of tartar, and volatiles, and laft of all, chalybeats; but the laft are not to be given till the humours are fufficiently attenuated, otherwife an incurable fchirrus of the liver may enfue. He alfo recommends the terra foliata, otherwife called tartarum regeneratum, and, by the college, fal diureticus, as the greateft diffolvent, and the moft powerful remedy in this difeafe. Its dofe is from five grains to a fcruple, and upwards.

Saponaceous medicines are often given with the fame intention in this difeafe with fuccefs, thus: take Caftile foap, three ounces; powder of the rhapontick plant, and fpecies of hiera picra, of each half an ounce; as much of the firup of orange-peel as is fufficient to make an electuary, of which the patient is to take from half a dram to a whole dram twice a-day. After fome time, with the above precaution, may be added half an ounce of fteel-filings: or take gum ammoniack, two drams; powder of fquills, one dram; Caftile foap, three drams; and a fufficient quantity of white fugar: make ten pills out of every dram, three of which are to be taken every morning, and as many at night going to bed.

Thefe are attenuants which fhould be preceded with gentle purgatives; for Hoffman affirms, that all draftick purgatives are prejudicial, as they increafe fpafms, throw the blood into violent commotions, and impair the ftrength: therefore, befides thefe which Huxham has directed above, the following formula may be fometimes proper. Take of good rhapontick powder half a dram; cream of tartar, one dram; fimple cinnamon-water, three ounces, and firup of rofes two drams, for a draught.

JAW, *Maxilla*, in anatomy, a bone of the face; there are two maxillæ, namely, the upper and the lower. In the fuperior maxilla or upper jaw are eleven bones, joined to each other per harmoniam, namely, two offa maxillaria or great bones of the upper jaw, fituated one on each fide in the anterior and middle parts of the face; the two offa malarum, or offa zygomatica and malaria, fituated in the lateral and middle parts of the face; the offa nafi, which are two in number, joined together and fituated below the forehead; the offa unguis or lachrymalia, which are two in number, each being fituated in the orbit, at the lower part of the internal angle; the offa palati, which are two, fituated in the pofterior part of the arch of the palate; and, laftly, the vomer, fituated perpendicularly between the two nafal foffæ backward.

The lower jaw, which in children confifts of two, connected by a cartilage in the middle of the chin, becomes one bone in adults, and makes the lower part of the face, fomewhat refembling a bow with the ends bent upward.

The upper jaw is immoveable in man and all other animals, except a parrot, crocodile, and acus vulgaris, or gar-fifh; it has generally fixteen fockets or alveoli for the like number of teeth.

The lower jaw confifts of two tables very folid, but not equally thick in all parts. It has a larger fhare of diploe than any other bone of the face, efpecially near the alveolary arch. The upper edge of the body of the lower jaw is pierced into fixteen foffulæ or fockets that contain the like number of teeth.

IBEX, in zoology, an animal of the goat kind, with extremely long nodofe horns, which bend backwards, and are of a blackifh colour, and annulated on the furface. The body is of a dark dufky colour, and is lefs in proportion to the height than that of the common goat: it has a great refemblance to the deer-kind; the legs are alfo perfectly, like thofe of the deer, ftraight, elegant, and flender. It is frequent in many parts of Europe, and, notwithftanding its vaft horns, runs and leaps with furprifing force and agility.

IBIS, a bird which was very ufeful to the Egyptians for deftroying ferpents, locufts, and caterpillars; and, on that account, had divine honours paid it.

It is all over black, and about the fize of the curlew, with the head of a cormorant, and the long neck of a heron.

ICE, *Glacies*, in phyfiology, a folid, tranfparent, and brittle body, formed of fome fluid, particularly water, by means of cold. See Cold, Frost, and Freezing.

Ice-House, a building contrived to preferve ice for the ufe of a family in the fummer feafon.

Ice-houfes are more generally ufed in warm countries than with us, particularly in Italy, where the meaneft perfon, who rents a houfe, has his vault or cellar for ice.

ICH DIEN, the motto of the prince of Wales's arms, fignifying, in the High Dutch, *I ferve.*

ICHNEUMON, in zoology, the name of an animal, of which there have been a multitude of idle and fabulous things afferted. It is a creature of the weafel kind, with a longer and narrower body than a cat, and fomewhat approaching both in fhape and colour to the badger.

Ichneumon is alfo the name of a genus of flies, of the hymenoptera order, with a triple fting at the anus.

ICHNOGRAPHY, in perfpective, the view of any thing cut off by a plane parallel to the horizon, juft at the bafe of it. Among painters it fignifies a defcription of images, or of ancient ftatues of marble and copper, of bufts and femi-bufts, of paintings in frefco, Mofaic works, and ancient pieces of miniature.

Ichnography, in architecture, a defcription or draught of the platform or ground-work of a houfe, or other building. Or it is the geometrical plan or platform of an edifice or houfe, or the ground-work of an houfe or building, delineated upon paper, defcribing the form of the feveral apartments, rooms, windows, chimnies, &c.

Ichnography, in fortification, denotes the plan or reprefentation of the length and breadth of a fortrefs, the diftinct parts of which are marked out, either on the ground itfelf, or on paper.

ICHOGLANS, the grand fignior's pages, ferving in the feraglio.

ICHOR properly signifies a thin watery humour, like serum; but is sometimes also used for a thicker kind, flowing from ulcers, called likewise sanies.

ICHTHYOCOLLA, vulgarly called isinglass, a solid glutinous substance, prepared from a fish of the sturgeon kind caught in the rivers of Russia and Hungary.

ICHTHYOLOGY, ιχθυολογια, the science of fishes, or that branch of zoology which treats of fishes. See FISH.

ICHTHYOLOCIST, an author who has written professedly of fishes.

ICHTHYS, ιχθυς, in antiquity, a celebrated acrostick of the Erythræan sibyl: the first words of each verse of which make up Ιησȣ Χριϛος Θεȣ υιος σωτηρ, that is, *Jesus Christus Dei filius servator*; and the initial Greek letters form the word ιχθυς, whence the name.

ICONOCLASTS, εικονοκλαϛόι, in church history, an appellation given to those persons, who, in the eighth century, opposed image-worship; and is still given by the church of Rome to all Christians who reject the use of images in religious matters. See IMAGE.

ICOSAHEDRON, a regular solid, terminated by 20 equilateral and equal triangles. It may be considered as consisting of 20 triangular pyramids, whose vertices meet in the centre of a sphere that circumscribes them, and therefore have their heights and bases equal; wherefore the solidity of one of these pyramids multiplied by 20, the number of bases, gives the solid content of the icosahedron.

ICOSANDRIA, the name of the 12th class in the Linnæan system of botany, comprehending those plants whose flowers are hermaphrodite. The calyx monophyllous and concave, with the corolla fastened by its claws to the inner side of the cup; and containing 20 or more stamina affixed to the cup. The principle characteristick of this class is rather to be taken from the manner of insertion; for though the number of stamina are rarely less than 20, yet in some species they frequently exceed it. To this class belong the torch-thistle, almond, plumb, pear, strawberry, myrtle, with several other genera.

ICTERICK DISEASE, the same with the jaundice. See JAUNDICE.

IDEA, the representation or resemblance of something, even though not seen, as conceived by the mind.

The word is Greek, signifying the same thing, and derived from ειδω, to see.

As to the origin of ideas, the Peripateticks maintain that external objects emit species entirely resembling them, and that these species striking on our senses are by them transmitted to the understanding; that being material, they are rendered intelligible by the active intellect, and are at length received by the passive.

Others think that our souls have of themselves the power of producing ideas of things we would think upon, and that they are excited to this by the impressions which objects make on our senses, though these impressions are not images of any thing resembling the objects that occasioned them.

Others maintain that the mind, by considering itself and its own perfections, can discover all things that are without. Others, with Des Cartes, hold that our ideas are innate or born along with us.

Malebranche and his followers maintain that God has in himself the ideas of all the beings he has created, and thus he sees all things in considering his own perfections to which they correspond; and that, as he is intimately united to our souls by his presence, our minds perceive things in him which represent created beings; and that thus we come by all our ideas: and yet, says he, though we see all sensible things in God, we have not our sensations in him: for in our perception of any sensible object is included both a sensation and a pure idea. The sensation is a modification of the soul, and it is God who causes it in us; but the idea joined with the sensation is in God, and it is in him we see it.

The Cartesians distinguish three kinds of ideas; the first innate; such as we have of God, as a being infinitely perfect: secondly, adventitious, which the mind receives in proportion as objects present themselves to our senses; thirdly, factitious, those which the mind forms by assembling and combining the ideas it already had, and these are called complex. But Mr. Locke has made it appear that all our ideas are owing to our senses, and the reflection of our minds upon those ideas which the senses have at first furnished us with; and that the distinction of the Cartesians is mere chimera.

So that a person destitute of one sense would have no idea belonging to that sense; and if destitute of all the senses, he would have no idea at all, not even of reflection, as wanting all sensation that should excite in him the operations of his mind, which are the objects of his reflection. Thus far the mind is altogether passive.

Ideas only seem to be innate, because we find we have them, as soon as we come to the use of reason, being in effect what we formed from the ideas wherewith the mind was insensibly filled by the senses.

Ideas are divided into simple and complex.

Simple IDEAS comprize all those which come into the mind by sensation; some of which we acquire purely by means of one sense; others by several senses: there are other simple ideas formed in the mind both by sensation and reflection jointly. Of some of these kinds of ideas all our knowledge consists.

We should distinguish between simple ideas, as they are perceptions in the mind, and as they are modifications of the bodies that cause such perceptions, that we may not think they are exactly the images of something inherent in the object; for most of those of sensation are in the mind no more the likeness of any thing existing without us, than the names that stand for them are the likeness of the ideas.

But here the qualities of the bodies which produce these ideas in us are to be distinguished into primary and secondary: the former are such as are utterly inseparable from the body, in whatever state it be, and such as our senses constantly find in every particle of matter, as solidity, extension, &c. Secondary qualities are such as are only powers in the objects to produce various sensations in us by means of their primary ones, as the figure, bulk, &c. of their particles, as colour, taste, &c.

Now the ideas of primary qualities are in some sense resemblances of them; but those produced in us by the secondary qualities have no resemblance of them at all, being only a power to produce those sensations in us.

The mind has several faculties of managing these simple ideas, as 1. That of distinguishing rightly between one and another, wherein consists the accuracy of judgment. 2. That of comparing them one with another, as to extent, time, place, or any other circumstances of relation. 3. That of putting together the simple ideas of sensation and reflection, in order to form complex ones. 4. Children, having got some ideas, by degrees learn the use of signs: hence the use of words being to stand as outward marks of our internal ideas, if every particular idea that we take in should have a particular name affixed to it, names would grow endless. To prevent this, the mind has another faculty, whereby it can make the particular ideas received from such objects become general; which is done by considering them as they are appearances in the mind separate from all other existences, and circumstances of existence, &c. and this is called abstraction. Thus the same colour being observed to day in chalk, which we observed yesterday in paper, we, considering that appearance alone, make it a representation of all the same kind, and call it whiteness.

From these four powers all our complex ideas are formed: and as before the understanding was passive, so here it is active.

Complex IDEAS may be reduced to these three heads, namely, modes, substances, and relations: modes are such complex ideas as are not supposed to exist by themselves, but are considered as dependencies on substances, as triangle, gratitude, &c. Of these there are two kinds, 1. Such as are only variations of the same simple idea, as ten, a score, &c. 2. Such as are compounded of simple ideas of several sorts put together, to make a complex one, as beauty, theft, &c.

Substances have their ideas from such combinations of simple ideas as represent distinct things subsisting by them-

themſelves; in which the idea of ſubſtance, confuſed as it is, is always the firſt. Relations are complex ideas ariſing from the compariſon of one idea with another. Of theſe ſome only depend on the equality or exceſs of the ſame ſimple idea in ſeveral ſubjects, and theſe may be called proportional relations, ſuch as equal, more, &c. Another occaſion of comparing things is owing to the circumſtances of their original, which, not being afterwards to be altered, make the relations depending thereon as laſting as the ſubjects to which they belong; as father, mother, &c. as alſo in the relations by inſtitution, as prince and people, &c. and as to moral relations, they are the conformity or diſconformity of men's free actions to laws and rules, whether human or divine.

Ideas may alſo be divided into clear or diſtinct, and obſcure or confuſed.

Simple ideas are clear, when they continue ſuch as the objects repreſent them; when our organs of ſenſation are in a good tone, our memories retain them, and can preſent them to the mind whenever it has occaſion to conſider them; and when the mind alſo ſees that thoſe ſimple ideas are ſeverally different one from another. The contrary to which is, what we call obſcurity and confuſion of ideas.

Again, ideas, with regard to their objects, are diſtinguiſhed into real or fantaſtical, true or falſe, adequate or inadequate.

Real Ideas are ſuch as have a foundation in nature, being conformable to that being to which they are referred as their archetypes.

Fantaſtical Ideas, ſuch as have no foundation in nature.

True and falſe Ideas.—When the mind refers its ideas to any thing extraneous to it, in ſuch a reference the mind makes a tacit ſuppoſition of their conformity to that thing; which ſuppoſition, as it is true or falſe, ſo the ideas themſelves come to be denominated. Real ideas are divided into adequate and inadequate; adequate ideas are thoſe which perfectly repreſent thoſe archetypes which the mind ſuppoſes them taken from, and which it makes them ſtand for; inadequate are ſuch as do but partially repreſent thoſe archetypes.

IDENTITATE nominis, in law, a writ that lies where a perſon is impriſoned inſtead of another of the ſame name, commanding the ſheriff to enquire whether the priſoner be the perſon, againſt whom the action was brought, or not; and if not, to diſcharge him.

IDENTITY, sameness, denotes that by which a thing is itſelf, and not any thing elſe; in which ſenſe, identity differs from ſimilitude as well as diverſity. The idea of identity we owe to that power which the mind has of comparing the very being and exiſtence of things, whereby conſidering any thing as exiſting at any certain time and place, and comparing it with itſelf as exiſting at any other time and place, we accordingly pronounce it the ſame, or different. Thus when we ſee a man at any time and place, and compare him with himſelf when we ſee him again at any other time or place, we pronounce him to be the ſame we ſaw before.

To underſtand identity aright, we ought to conſider the eſſence and exiſtence, and the ideas theſe words ſtand for; it being one thing to be the ſame ſubſtance; another, the ſame man; and a third, the ſame perſon. For, ſuppoſe an atom exiſting at a determined time and place, it is the ſame with itſelf, and will continue ſo to be at any other inſtant as long as its exiſtence continues; and the ſame may be ſaid of two or any number of atoms, whilſt they continue together; the maſs will be the ſame; but if one atom be taken away, it is not the ſame maſs. In animated beings it is otherwiſe, for the identity does not depend on the coheſion of its conſtituent particles, any how united in one maſs; but on ſuch a diſpoſition and organization of parts, as is fit to receive and diſtribute life and nouriſhment to the whole frame. Man therefore, who hath ſuch an organization of parts partaking of one common life, continues to be the ſame man, though that life be communicated to new ſucceeding particles of matter vitaly united to the ſame organized body; and in this conſiſts the identity of man, conſidered as an animal only. But perſonal identity, or the ſameneſs of an intelligent being, conſiſts in a continued conſciouſneſs of its being a thinking being, endowed with reaſon and reflection, capable of pain or pleaſure, happineſs or miſery, that conſiders itſelf the ſame thing in different times and places. By this conſciouſneſs every one is to himſelf, what he calls *ſelf*, without conſidering, whether that *ſelf* be continued in the ſame or divers ſubſtances; and ſo far as this conſciouſneſs extends backward to any paſt action, or thought, ſo far extends the identity of that perſon, and makes it the object of reward and puniſhment. Hence it follows, that if the conſciouſneſs went with the hand, or any other limb when ſevered from the body, it would be the ſame *ſelf* that was juſt before concerned for the whole. And if it were poſſible for the ſame man to have a diſtinct incommunicable conſciouſneſs at different times, he would without doubt at different times make different perſons.

IDES, *Idus*, in the Roman calendar; eight days in each month are ſo denominated, commencing in the months of March, May, July, and October, on the fifteenth day, and in the other months on the thirteenth, and reckoned backward, ſo as in the four months above ſpecified to terminate on the eighth day, and in the reſt on the ſixth.

The ides came between the calends and nones. The 14th day of March, May, July, and October, and the 12th day of the other 8 months, was pridie idus, or the eve of the ides; the 13 in the 4 months, and the 11th in the other eight, was called 3 idus or the third of the ides of ſuch months: and ſo on to the 8th and 6th days, which made the 8th of the ides, 8 idus.

This method of reckoning is ſtill retained in the Roman chancery and calendar of the breviary.

The ides of May were conſecrated to Mercury; thoſe of March were ever eſteemed unhappy after Cæſar's murder on that day: the time after the ides of June was reckoned fortunate for thoſe who entered into matrimony; the ides of Auguſt were conſecrated to Diana, and obſerved as a feaſt-day by the ſlaves. On the ides of September auguries were taken for appointing the magiſtrates, who formerly entered upon their office in the ides of May, afterwards on thoſe of March.

IDIOM, *Idioma*, either the peculiarities of a language, or the particular dialect of ſome province, differing in ſome reſpects from the language of the nation in general from which it is derived.

IDIOPATHY, in phyſick, denotes a primary and proper affection of any part: thus the head is affected idiopathically, in a lethargy; and the lungs in a pleuriſy: but when theſe parts ſuffer by conſent, that is, by diſorders reſiding in other parts, they are then ſaid to ſuffer by ſympathy.

IDIOSYNCRASY, in phyſick, denotes a peculiarity of conſtitution, by which one body differs from another, both with reſpect to the ſolids and fluids, though each may be in a ſound condition: in conſequence whereof, whether in health or ſickneſs, it has a more than ordinary averſion or inclination to certain things, and is more affected with them than others uſually are.

The diſorders ariſing from this peculiarity are ſometimes accounted incurable, becauſe they are thought to be preſent from the very firſt formation of the body.

Sydenham, treating of heſterick diſorders, remarks, that ſome women, by reaſon of a certain idioſyncraſy, have ſo great an averſion to hyſterick medicines, which are ſo generally ſerviceable in this diſeaſe, that, inſtead of being relieved, they are injured thereby. In ſuch, therefore, they are to be wholly omitted: for as Hippocrates obſerves, it is fruitleſs to oppoſe the tendency of nature.

IDIOT, in the Engliſh laws, denotes a natural or fool from his birth.

A perſon who has underſtanding enough to meaſure a yard of cloth, number 20 rightly, and tell the days of the week, &c. is not an idiot in the eye of the law. In other countries repeating the Lord's prayer ſaves a man from being reckoned an idiot.

Idiot, *Idiota*, alſo denotes, among ancient writers, a perſon ignorant or unlearned, anſwering to illiteratus, imperitus.

IDIOTISM, in grammar, a manner of ſpeaking peculiar to a language, which cannot be rendered word for word into any other.

IDOL, a ſtatue or repreſentation of ſome falſe god, to whom divine honours are paid, by erecting temples, offering ſacrifices and prayers thereto.

IDOLATRY, the adoration paid to idols and falſe gods, which is due to God alone. We have no poſitive and hiſtorical proof of the origin of idolatry. It is very probable that idolatry was introduced by degrees, and that they who made the firſt ſtep towards this impiety, did not carry it to the point at which it afterwards arrived. We muſt not believe that idolatry came all from the ſame country: every nation ſet up its particular gods, and a religion after its own mode, whence proceeded the monſtrous diverſity of opinions and worſhip, which is to be met with in Paganiſm. At preſent idolatry flouriſhes moſt in China, &c.

IDYLLION, in poetry, a ſmall poem containing the deſcription of ſome agreeable adventure. It paints the objects it deſcribes, as epick poetry narrates, and dramatick acts them. The idyllions of Theocritus with a ruſtick kind of ſimplicity are full of the moſt exquiſite beauties; they ſeem drawn from nature herſelf, and to have been dictated by the graces. The modern writers of idyllions do not keep up to that original ſimplicity which is obſervable in Theocritus. Boileau obſerves that the ſhorteſt idyllions are commonly the beſt.

JECTIGATION, *Jectigatio*, in phyſick, a palpitation, or convulſive motion of the whole body, one ſide, or only of the heart and pulſe of a ſick perſon, which ſhews that the brain, which is the origin of the nerves, is attacked, and threatened with convulſions.

JECUR, the liver, in anatomy. See LIVER.

JEHOVAH, one of the ſcripture names of God, ſignifying the Being who is ſelf-exiſtent, and gives exiſtence to others.

"The Jews have had many ſuperſtitious opinions relative to this name; which, becauſe they were forbidden to mention *in vain*, they would not mention *at all*. They ſubſtituted *Adonai*, &c. in its room, whenever it occurred to them in reading or ſpeaking; or elſe, ſimply and emphatically ſtyled it השם *the name*. Some of them attributed to a certain repetition of this name the virtue of a charm, and have had the boldneſs to aſſert, that our bleſſed Saviour wrought all his miracles (for they do not deny them to be ſuch) by that myſtical uſe of this venerable word." See *Horæ Solitariæ*. A book that needs only to be known, to be admired by every lover of learning and religion.

JEJUNUM, in anatomy, the ſecond of the ſmall guts, ſo called becauſe it is generally found empty. This is owing to the fluidity of the chyle, the greater ſtimulus of the bile in it, and the abundance of the lacteal veſſels with which it is furniſhed. Its ſituation is in the region above the navel; it has a great many connivent glands. Its beginning is where the duodenum ends; and it terminates where theſe valves are obliterated. Its length is different in various ſubjects; but it is uſually between thirteen and ſixteen ſpans.

JEOFAILE, or JEOFAYLE, in law, a term uſed for an overſight in pleading, or other proceedings in law.

JESUITS, or the ſociety of Jeſus, a moſt famous religious order in the Roman church, founded by Ignatius Loyola, a native of Guinuſcoa in Spain, in the year 1538, but now aboliſhed with the conſent of all the Catholick powers.

JET, *Gagates*, in natural hiſtory, a ſolid, dry, opake, inflammable ſubſtance, found in large detached maſſes, of a fine and regular ſtructure, having a grain like that of wood, ſplitting more eaſily horizontally than in any other direction, very light, moderately hard, not fuſible, but readily inflammable, and burning a long time with a fine greeniſh flame. It is of a fine deep black colour, very gloſſy and ſhining, except upon its ſurface, where it has been fouled by accident. When examined by the microſcope, it is found to be compoſed of a number of parallel plates, very thin, and laid cloſely upon one another. It is not ſoluble in, nor makes any effervеſcence with acids. It ſhould be choſen of the deepeſt black, of a moderate hardneſs, very light, and ſuch as will ſplit moſt evenly in an horizontal direction; this being its great characteriſtick, by which it is diſtinguiſhed from the cannel-coal, which breaks equally eaſy any way. Jet is of great uſe to perfumers, and is ſometimes preſcribed in medicine.

JET D'EAU, a French term, frequently alſo uſed with us, for a fountain that caſts up water to a conſiderable height in the air. See ADJUTAGE and FOUNTAIN.

JETSON, JETSEN, or JETSAM, in law, is uſed for any thing thrown out of a ſhip or veſſel that is in danger of being a wreck, and which is driven by the waves on ſhore. See FLOTSON.

JEWEL, any precious ſtone or ornament beſet with them. See DIAMOND, RUBY, &c.

JEWEL-BLOCKS, among ſailors, certain pullies hung to the outer ends or yard-arms of the top-ſail yards: they are uſed to hoiſt the ſtudding-ſails by. See STUDDING-SAIL.

JEWEL-OFFICE, an office belonging to the crown, that has the charge of faſhioning and weighing the king's plate, and delivering it out by warrants from the lord chamberlain. The principal officer is the maſter of the jewel-office, who has a ſalary of 450l.

JEWS, thoſe who profeſs obedience to the laws and religion of Moſes. When a modern Jew builds an houſe, he muſt leave part of it unfurniſhed, in remembrance that the temple and Jeruſalem now lie deſolate. They lay great ſtreſs upon frequent waſhings. They abſtain from meats prohibited by the Levitical law; for which reaſon, whatever they eat muſt be dreſſed by Jews, and after a manner peculiar to themſelves. Every Jew is obliged to marry, and a man who lives to 20 unmarried, is accounted as actually living in ſin. The Jews, it is ſaid, were formerly at the diſpoſal of the chief lord where they lived, and likewiſe all their goods. A Jew may be a witneſs by our law, being ſworn on the Old Teſtament, and taking the oaths to government.

JEWISH HOURS, in chronology. See HOUR.

IGNIS FATUUS, in meteorology, a meteor, otherwiſe called Will-with-a-Wiſp. See WILL-*With-a-Wiſp*.

IGNIS GEHENNÆ, the ſame with the univerſal diſſolvent, or alkaheſt. See ALKAHEST.

IGNIS JUDICII, in our old cuſtoms, a purgation by fire. See ORDEAL.

IGNITION, in chymiſtry, the heating metals red-hot, without melting them. Lead and tin are too ſoft to bear ignition, which takes effect only in harder metals, as gold and ſilver, but eſpecially iron.

IGNORAMUS, in law, a term ſignifying we are ignorant. This is uſed when the grand jury, impanelled on the inquiſition of criminal cauſes, reject the evidence as too weak to make good the preſentment or indictment brought againſt a perſon, ſo as to bring him upon his trial by a petty jury; in which caſe they indorſe this word on the back of the bill of the indictment. In conſequence of which, all further proceedings againſt the party accuſed are ſtopped, and the ſuppoſed offender is delivered without further anſwer.

IGNORANCE, *Ignorantia*, the privation or abſence of knowledge. See KNOWLEDGE.

IGNORANCE, in law, is a want of knowledge of the laws, which will not excuſe a perſon from ſuffering the penalty inflicted on the breach of them: for every one is obliged, at his peril, to know the laws of the land. An infant who is juſt arrived at the age of diſcretion, and who may therefore be ſuppoſed to be ignorant of the law, is puniſhable for crimes: but at the ſame time infants of tender age, who are naturally ignorant, are excuſed. This is alſo the caſe with reſpect to perſons who are non compos mentis.

IGUANA, in zoology, an American ſpecies of lizard, with a long round tail, five toes on each foot, and the creſt of the throat and the dorſal ſuture dentated.

ILEX, the HOLM-OAK, or EVERGREEN, in botany. See HOLLY.

ILIACK PASSION, in medicine, a pain in the ſmall inteſtines, apt to turn to an inflammation, in which their periſtaltick motion is inverted, and their contents, and even the excrements themſelves, are voided by the mouth in vomiting. Nothing will paſs down, not ſo much as a flatus. It is often attended with fatal ſymptoms.

This diſeaſe, according to Hoffman, is preceded with coſtiveneſs, which is ſoon followed with moſt ſharp and violent

violent pains, and with an inflation, diftenfion, and a tumour of the umbilical region, which feels hard to the touch; the body is fo hard bound, that neither wind nor excrements can pafs downwards: foon after the wind firft makes it way upward, there comes on a naufea, and a frequent vomiting of a bilious and pituitous matter; the breathing grows difficult, and whatever is eaten or drank is foon thrown up again; redifh fæces, with ftinking fmell, are afterwards forced up by vomiting: this is fucceeded by lofs of ftrength, a preternatural heat, a hard and contracted pulfe, with great thirft: the urine is red, and is voided with difficulty.

When the cafe becomes defperate, a hiccoughing and delirium appear; the nerves are diftended, the body is all in a fweat, and violent convulfions and fainting fits put an end to the patient.

This difeafe may proceed from a rupture, either of the fcrotum or the groin; from poifons, from any thing that ftops up the paffage through the fmall guts, fuch as hard, dry food, chefnuts, fea-bifcuits, quinces, pears, unripe acerb fruit, when eaten in large quantities; to which drinking little, a fedentary life, and a melancholy difpofition of mind, will greatly contribute: thefe all tend to harden the fæces; the grofs inteftines may alfo be plugged up with fcybals, efpecially if a perfon, either through fhame, or want of conveniency, does not liften to the calls of nature.

As to the cure, Sydenham thinks it neceffary, firft of all, to bleed in the arm, and afterwards, in an hour or two, exhibit a powerful clyfter; the fmoke of tobacco blown into the bowels through an inverted pipe, he recommends as the moft efficacious remedy: this may be repeated fome time after, unlefs the effect of the firft renders it unneceffary. If the difeafe will not yield to thi', a ftrong cathartick is advifable: thus, take of the pi'l of fimple colocynth, half a dram; of calomel, one fcruple; and as much as fufficient of the balfam of Peru. Make the whole into four pills to be taken out of a fpoonful of firup of violets, taking no liquor upon them, left they gripe the patient, which they are otherwife inclinable to do.

As foon as the operation of cathartick is over, let the patient take 25 drops of the Thebiack tincture in half an ounce of fpirituous cinnamon-water; and when the vomiting and pain remit, let the cathartick be repeated; and if the pain returns, give the anodyne again, and repeat it every fourth or fixth hour, till the inteftines are eafy, and the cathartick begins to pafs downwards. When it has done working, give the following draught: take of fpirituous water of cinnamon, two ounces; of Thebiack tincture, 25 drops; of which make a draught, which is to be repeated twice or thrice a-day, till the vomitings and pains quite ceafe: afterwards it will be advifable to give a paregorick, at bed-time, for feveral nights.

Hoffman advifes, that the pains are mitigated by anodynes, that a cataplafm fhould be applied to the hypogaftrick region, to ftop the vomiting and hiccoughing, which may be compofed of equal parts of old Venice-treacle and expreffed oil of nutmegs, with the addition of oil of mint and camphire. This done, a gentle laxative of manna, cream of tartar, and oil of fweet almonds, may be given with a more happy fuccefs, if the excrements have been long retained.

When there is an inflammation, nothing is better than fix or eight grains of purified nitre, and half a grain of camphire mixed with fome antifpafmodick powder, and then taken in a convenient vehicle. Outwardly apply a liniment of exungua-humana, or any other penetrating fat, and a dram of camphire.

But when other things fail in the cure of the iliack paffion, recourfe muft be had to quickfilver; half a pound or a pound at moft is fufficient, with fat broth or oil; and the patient fhould lie on his right fide, or walk gently about the room, that its defcent may be eafier; but if there is an actual inflammation, the quickfilver fhould not be ufed. Opiates may be ufed to mitigate the pain, provided they are exhibited in the beginning after bleeding, or before there is any figns of a mortification. Clyfters are generally very advantageous, for they relax the fpafm of the grofs inteftines, whereby the excrements are more eafily difcharged.

ILIACUS Musculus, in anatomy, a broad mufcle lying on the infide of the os ilium. It is fixed by flefhy fibres to the internal labium of the creft of the os ilium, to that of the flope between the two anterior fpines, to the infide of thefe fpines, to the fuperior half of the infide of this bone, and to the adjacent lateral part of the os facrum. All thefe fibres, contracting by degrees, run obliquely towards the lower part of the mufculus pfoas, uniting with it; and being fixed by a kind of aponeurofis to the outfide of its tendon, all the way to the little trochanter.

ILIAD, ιλιας, in literary hiftory, the name of an ancient epick poem, the firft and fineft of thofe compofed by Homer. The poet's defign in the iliad was to fhew the Greeks, who were divided into feveral little ftates, how much it was their intereft to preferve a harmony and good underftanding among themfelves; for which end, he fets before them the calamities that befel their anceftors from the wrath of Achilles, and his mifunderftanding with Agamemnon; and the advantages that afterwards accrued to them from their union. The iliad is divided into 24 books, or rhapfodies, which are marked with the letters of the alphabet. The criticks maintain the iliad to be the firft, and yet the beft epick poem that ever appeared in the world. Ariftotle's poeticks are almoft wholly taken up about it, forming precepts from that poet's practice. Some authors tell us, that Homer invented not only poetry, but all other arts and fciences; and that there are vifible marks of a perfect knowledge of every one of them to be feen in the iliad. There is a tranflation of this noble poem into our language, by the late ingenious Mr. Pope; being, perhaps, the moft elegant, and moft in imitation of the original, of any attempt that way in any language whatever.

ILIUM, in anatomy, the third and laft of the fmall guts, is fituated principally below the navel, near the offa ilii; whence its name. Its length is various; fometimes not more than 15, fometimes 20 fpans or more. Its beginning is where the valves of the jejunum ceafe to be confpicuous, and its end is where the larger inteftines begin; in which place it is, in a very fingular manner, inferted into the left fide of the colon. It has no other valves except that great one at the end, which is called, by many, valvula coli Bauhini: its glands are, in general, more numerous towards the end than in any other part.

IMAGE, in a religious fenfe, is an artificial reprefentation or fimilitude of fome perfon or thing, ufed either by way of decoration and ornament, or as an object of religious worfhip and veneration: in which laft fenfe, it is ufed indifferently with the word idol.

IMAGINATION, a power or faculty of the mind, whereby it conceives and forms ideas of things communicated to it by the outward organs of fenfe.

IMBECILITY, a languid, infirm ftate of body; which, being greatly impaired, is not able to perform its ufual exercifes and functions.

IMBIBING, the action of a dry porous body, that abforbs or takes up a moift or fluid one: thus, fugar imbibes water; a fponge, the moifture of the air, &c.

IMBRICATED, among botanifts, an appellation given to fuch leaves of plants, as are placed over one another like the tiles of a houfe. The term imbricated is likewife applied to fome of the heart fhells, from their being ridged tranfverfely in the fame manner.

IMITATION, in literary matters, the act of doing or ftriving to copy after, or become like to another perfon or thing.

Imitation, in mufick, a particular way of compofition wherein each part is made to imitate the other, either throughout the whole piece, which is one of the kinds of canon; or only during fome meafures, which is a fimple imitation. Sometimes the motion or figure of the notes is only imitated, and that often by a contrary motion, which makes what they call a retrograde imitation.

IMMACULATE, fomething without ftain, chiefly applied to the conception of the holy virgin. See Conception.

IMMANENT, in logick. The fchoolmen diftinguifh two kinds of actions, the one tranfient, which pafs from the agent to the patient; the other immanent, which continue in the agent.

IMMATERIAL, fomething devoid of matter, or that is pure fpirit: thus God, angels, and the human foul, are immaterial beings.

IMMEDIATE, whatever is capable of producing an effect

effect without the intervention of external means; thus we say, an immediate cause, in opposition to a mediate or remote one.

IMMEMORIAL, in law, an epithet given to the time or duration of any thing, whose beginning we know nothing of.

IMMENSITY, an unlimited extention, or which no finite and determinate space, repeated ever so often, can equal.

IMMERSION, that act by which any thing is plunged into water, or other fluid. See FLUID.

Immersion, in astronomy, is when a star or planet is so near the sun with regard to our observations, that we cannot see it; being, as it were, enveloped and hid in the rays of that luminary. It also denotes the beginning of an eclipse of the moon, or that moment when the moon begins to be darkened, and to enter into the shadow of the earth; and the same term is also used with regard to an eclipse of the sun, when the disk of the moon begins to cover it. In this sense emersion stands opposed to immersion, and signifies the moment wherein the moon begins to come out of the shadow of the earth, or the sun begins to shew the parts of his disk which were hid before. See ECLIPSE.

Immersion is frequently applied to the satellites of Jupiter, and especially to the first satellite; the observation whereof is of so much use for discovering the longitude. The immersion of that satellite is the moment in which it appears to enter within the disk of Jupiter, and its emersion the moment when it appears to come out. The immersions are observed from the time of the conjunction of Jupiter with the sun, to the time of his opposition; and the emersions from the time of his opposition to his conjunction. The peculiar advantages of these observations is, that during 11 months of the year they be made, at least, every other day.

IMMORTAL, that which has no principle of corruption or alteration to hinder its lasting to all eternity. Thus God and the human soul are immortal.

IMMUNITY, in general, an exemption from some office or imposition. More particularly it denotes the liberties granted to cities and communities.

IMMUTABILITY, the state of a thing that cannot change. It is one of the divine attributes, and is twofold, physical and moral.

The physical immutability consists in this that the substance of God does not, or cannot, receive any alteration; his moral immutability consists in his not being liable to any change in his thoughts, will, or designs, having willed what he wills from all eternity.

IMPALED, in heraldry, denotes a shield party per pale or divided into two equal parts by a line drawn palewise through the middle from top to bottom. As the coats of a man and his wife are impaled, or marshalled in pale, that is, the husband's on the right side, and the wife's on the left; and this the heralds call baron and femme, two coats impaled.

If a man has had two wives, he may impale his coat between theirs; and, if more than two, they are to be marshalled on each side of his in their proper order.

IMPALPABLE, any thing whose parts are so minute, as to be imperceptible to the senses, particularly that of feeling.

IMPASTATION, *Impastatio*, a reduction of powders or any other substance to the form of a paste, by means of some proper fluid.

IMPEACHMENT *of Waste*, a restraint from committing waste upon lands or tenements; or a demand of reparation for waste made by a tenant who has but a limited estate in the land granted.

He that hath a lease without this impeachment, hath thereby a property in the houses, trees, &c. without being accountable for any waste made in them.

IMPENETRABILITY, that property of body whereby it so fills up a certain space, as that there is no room in it for any other body.

IMPENITENCE, or IMPENITENCY, a hardness of heart which makes a person persevere in vice, and prevents his repentance.

IMPERATIVE, in grammar, one of the moods of a verb, serving to express commandment, as go, come, stay, &c. In the oriental languages the future tense has frequently an imperative signification.

IMPERFECT, something that is defective, or that wants some of the properties found in other beings of the same kind: thus mosses are called imperfect plants, because almost all the plants of fructification are wanting in them; and for the like reason, is the appellation imperfect given to the fungi and submarine plants.

IMPERFECT *Tense*, in grammar, denotes an indefinite time between the present and past, as, I thought, I felt, &c.

IMPERFECT *Flowers*, those flowers which want the petala, also called apetalous and staminous flowers.

IMPERFECT *Numbers*, in arithmetick, those numbers whose aliquot parts, taken together, do not make the just number itself, but either come short of it; in which case they are called deficient numbers; or exceed it, and then they are called redundant.

IMPERIAL, something belonging to an emperor or empire.

IMPERIAL *Chamber*, one of the supreme courts in Germany, the Aulick council being the other, established for the affairs of the immediate states of the empire.

IMPERIAL *Cities*, such as have a right to send deputies to the diet of the empire, and own no other head but the emperor. These are a kind of little commonwealths, the chief magistrate whereof does homage to the emperor, and pays him the Roman month; but in all other respects the magistrate is sovereign within the jurisdiction of his own city.

IMPERIAL *Diet*, an assembly of all the states of the empire. It is usually held at Ratisbon, where the emperor and electors, commonly represented by deputies, as also the secular and ecclesiastical prelates, princesses, counts, and deputies of imperial cities assist.

The diet consists of three colleges, namely, that of the electors, where the elector of Mentz presides as director; the college of princes, prelates, princesses and counts, where the archbishop of Saltzburg presides; and lastly, the college of the deputies of imperial cities, where the deputy of Cologne presides.

In the diet, each principality has a vote; but all the prelates, so they call the abbots and provosts of the empire, have but two voices; and all the counts but four.

IMPERSONAL *Verb*, in grammar, such a verb in the Latin as is only used in the third person singular, as libet, oportet, decet, &c.

IMPERVIOUS, a thing that cannot be passed through, either by reason of the closeness of its pores, or particular configuration of its parts.

IMPETIGO, in medicine, a tetter or virulent itch, the same with lichen, volatica, and mentagra. It is a kind of dry and scaly itch, which, after the abrasion of the escar, leaves bloody spots under the skin, and upon the approach of heat produces a painful and almost intolerable itching. This disorder is most familiar to scorbutick persons, and those afflicted with a serous cacochymy; and if it be in a great degree, it is called a leprous psora.

In the worst kind of this disease, the head is very often affected, and a crust grows all over the body, without excepting even the face, lips, and hands. Besides, the whole skin becoming ulcerous, discharges a serous, corrosive sanies, and the cuticula is soon after separated, so that dry scales may be easily taken off, whilst the subjacent skin, which is of a dark red colour, discharges an acrid moisture. Hence a fœtid smell is produced, and the patients having a keen appetite, complain of an insatiable thirst.

But if this species of the itch, succeeding a gonorrhœa, buboes, and other disorders of the genitals, not only seizes the whole body, but particularly the face, and is attended with notes and tophi in various parts; and if the pains which accompany it, being corroding, penetrating, intense, and pungent, increase in the night; the disorder is called venereal and malignant.

The whole method of cure, and all the powers of the remedy, ought to aim at discharging out of the body the mass of corrupt, glutinous and acrid humours, by sufficient bleeding and abstinence; by purges, both gentle as milk is; and drastick as hellebore: Then that by congruous aliments and a proper regimen of diet, juices of a laudable quality and agreeable to nature may be generated; and lastly, that, by external, detersive, consoli-

dating, and drying remedies, the parts may be freed from pains, tumours, itching and ulcers. See ITCH.

IMPETRATION, the obtaining any thing by request; it more particularly denotes, in our ftatues, the pre-obtaining of benefices and church livings in England from the court of Rome, which were in the difpofal of the king and other lay-patrons; the penalty whereof is the fame with that of provifors, 25. E. III.

IMPETUS, in mechanicks, a kind of force by which bodies act, when impelled in any direction by any other body. See MOMENTUM. In difeafes it is the fame with paroxyfm.

IMPING, in falconry, the inferting of a feather in the wing of a hawk, in the place of one that is broke.

IMPLEAD. To implead, fignifies the fame as to profecute or fue a perfon by courfe of law.

IMPLICIT, whatever is contained in a difcourfe or propofition, not in exprefs terms, but tacitly, and only deducible by confequence.

IMPORTATION, the bringing in goods from other countries, and is ufed in oppofition to exportation.

IMPOSITION *of Hands*, in ecclefiaftical matters, is at prefent confined to that impofition which is ufed in ordination, whereby the evangelical miffion, &c. is conveyed; as alfo to the impofing of the bifhops hands in confirmation.

IMPOSSIBLE, whatever is not poffible to be done. A propofition is faid to be impoffible, when it contains two ideas that mutually deftroy each other; thus it is impoffible that a fquare fhould be a circle; fince we clearly perceive that fquarenefs and roundnefs deftroy each other by the contrariety of their figure.

There are two kinds of impoffibilities, phyfical and moral: the former, what cannot be done by the powers of nature; the latter, when of its own nature it is poffible, but yet attended with fuch difficulties, that, every thing confidered, it appears impoffible; as that all men fhould be virtuous, or that the fame numbers fhould be thrown any number of times with three dice, &c.

Any thing contrary to decency and good fenfe is alfo faid to be impoffible, from this topick, Omne turpe eft impoffibile; though in itfelf very poffible to fuch as have no regard to good fenfe, &c.

IMPOST, in law, any tax appointed by the fovereign authority to be paid for fuch merchandizes as are brought from foreign countries; and it is fometimes applied to a tax levied from inland goods of home production. It is commonly diftinguifhed from cuftom, which properly fignifies the duties paid for goods exported.

IMPOSTS, in architecture, the capitals of pillars or pilafters that fuftain arches, alfo called chaptrel, being a fort of plinth or little cornice which crowns a pier over which an arch or vault commences.

The Tufcan impoft is a plinth only; the Dorick has two faces crowned; the Ionick a larmier over the two faces, and its mouldings often carved; the Corinthian and Compofite have a larmier, frieze, and other mouldings. The projecture of the impoft muft not exceed the naked of the pilafter, fometimes the entablature of the order ferves for the impoft of the arch, and has a very ftately appearance.

IMPOSTHUME, in furgery, a collection of purulent matter in any part of the body. See ABSCESS.

IMPOTENCE, or IMPOTENCY, in general, denotes want of ftrength, power, or means to perform any thing, but more particularly the want of ftrength in a man to perform the rights of the marriage bed.

IMPRECATION, a curfe, or wifh that evil may befal any one.

IMPRESSION, is applied to the fpecies of objects, which are fuppofed to make fome mark or impreffion on the fenfes, the mind, and the memory.

IMPRESSION, alfo denotes the edition of a book, regarding the mechanical part only; whereas edition, befides this, takes in the care of the editor, who corrected or augmented the copy, adding notes, &c. to render the work more ufeful.

IMPRISONMENT, the ftate of a perfon reftrained of his liberty, and detained under the cuftody of another.

IMPROPRIATION, a parfonage or ecclefiaftical living, the profits of which are in the hands of a layman; in which fenfe, it ftands diftinguifhed from appropriation, which is where the profits of a benefice are in the hands of a bifhop, college, &c. though thefe terms are now often ufed promifcuoufly. See APPROPRIATION.

IMPUTATION, in general, the charging fomething to the account of one, which belonged to another: thus, we fay, that Adam's fin is imputed to all his pofterity. In the fame fenfe, the righteoufnefs and merits of Chrift are imputed to true believers.

INACCESSIBLE, fomething that cannot be come at, or approached, by reafon of intervening obftacles, as a river, rock, &c. It is chiefly ufed in fpeaking of heights and diftances. See ALTITUDE and DISTANCE.

INALIENABLE, that which cannot be legally alienated or made over to another: thus the dominions of the king, the revenues of the church, the eftates of a minor, &c. are inalienable, otherwife than with a referve of the right of redemption.

INANIMATE, a body that has either loft its foul, or that is not of a nature capable of having any.

INANITION, among phyficians, denotes the ftate of the ftomach when empty, in oppofition to repletion.

INARCHING, in gardening, is a method of grafting, commonly called grafting by approach. See the article GRAFTING.

INCAMERATION, a term ufed in the chancery of Rome, for the uniting of lands, revenues, or other rights, to the pope's domain.

INCANTATION, denotes certain ceremonies, accompanied with a formula of words, and fuppofed to be capable of raifing devils, fpirits, &c.

INCAPACITY, in the canon-law, is of two kinds: 1. The want of a difpenfation for age in a minor, for legitimation in a baftard, and the like: this renders the provifion of a benefice void in its original. 2. Crimes and heinous offences, which annul provifions at firft valid.

INCARNATION, in theology, the act whereby the fecond perfon of the Holy Trinity affumed the human nature, viz. a true body and reafonable foul, in order to accomplifh the redemption of fallen mankind. See TRINITY.

The generation of Chrift was miraculous, as being conceived by the power of the Holy Ghoft, and born of the Virgin Mary; from the time of which bleffed nativity, the Chriftian æra commences. See EPOCHA.

INCARNATIVES, in furgery, medicines which affift nature in filling up wounds or ulcers with flefh; or rather remove the obftructions thereto. Internal incarnatives are aliments which fupply a balfamick chyle, and confequently generate flefh, and produce a full or plump habit.

INCARTATION, among chymifts, the fame with depart. See DEPART.

INCEPTIVE, a term ufed by Dr. Wallis to exprefs fuch moments, or firft principles, which, though of no magnitude themfelves, are notwithftanding capable of producing it. Thus, a point is inceptive of a line, and a line inceptive of a furface, &c.

INCEST, the crime of venereal commerce between perfons who are related in a degree wherein marriage is prohibited by the law of the country.

INCEST SPIRITUAL, a crime committed in like manner between perfons who have a fpiritual alliance by means of baptifm or confirmation.

INCH, a well known meafure of length; being the twelfth part of a foot, and equal to three barley corns in length. See FOOT and MEASURE.

INCH *of Candle*, or fale by inch of candle. See the article CANDLE.

INCIDENCE, in mechanicks and opticks, denotes the direction in which one body ftrikes another. See ANGLE.

INCIDENT, in law, fomething that infeparably belongs to another: thus a court baron is incident to a manor.

INCIDENT, in poetry, denotes much the fame with epifode. See EPISODE.

INCISIVE, an appellation given to whatever cuts or divides: thus, the fore-teeth are called dentes incifivi, or cutters; and medicines of an attenuating nature, incidents, or incifive medicines.

INCLINATION is a word frequently ufed by mathematicians, and fignifies the mutual approach, tendency or leaning of two lines, or two planes, towards each other, fo as to make an angle.

Inclination of a right line to a plane, is the acute angle which that line makes with another right line drawn in the plane through the point where the inclined line interfects it, and through the point where it is alfo cut by a perpendicular drawn from any point of the inclined plane.

Inclination of the axis of the earth, is the angle which it makes with the plane of the ecliptick; or the angle contained between the planes of the equator and ecliptick.

Inclination of a planet is an arch of the circle of inclination, comprehended between the ecliptick and the plane of a planet in its orbit.

The greateft inclination of Saturn, according to Kepler, is 2° 32′; of Jupiter, 1° 20′; of Mars, 1° 50′ 30″; of Venus, 3° 22′; of Mercury, 6° 54′. According to de la Hire, the greateft inclination of Saturn is 2° 33′ 30″; of Jupiter, 1° 19′ 20″; of Mars, 1° 51′ 00″; of Venus, 3° 25′ 5″; of Mercury, 6° 52′ 00″.

Inclination *of a Plane*, in dialling, is the arch of a verticle circle, perpendicular both to the plane and the horizon, and intercepted between them.

Inclined Plane, in mechanicks, that which makes an oblique angle with the horizon.

That an inclined plane is a mechanical power appears fufficiently in its diminifhing the weight of a body laid upon it in regard to the power which holds it in æquilibrio. Let A (*plate* XLIII. *fig.* 2.) be a body fuftained on the inclined plane BD; from the centre C draw CF perpendicular to the horizon or bafe DC, and CE perpendicular to the plane; then CF will reprefent the whole weight or force of gravity of the body A, which is refolvible into the two forces CE and EF; but the force CE, being perpendicular to the plane, acts wholly upon it, and is equally re-acted on or fuftained by the plane; the other force EF, being parallel to the plane, is that by which the body defcends, or is kept from defcending by an equal power acting in a contrary direction. Therefore the whole weight of the body is to the power which keeps it in æquilibrio on the plane as CF to FE, or (becaufe the triangles CFE and BDC are fimilar) as BD to BC, that is, as the length of the plane to its height.

If it fhould be required to lift up a very heavy body as W or *w* (*fig.* 3.) the height CB, it would be impracticable to raife it up in the line CB without a power whofe intenfity is equal to that of the weight; and even in that cafe very inconvenient to do it, efpecially in building. But if an inclined plane AB be laid arifing from the horizontal line AC, from whence the weight is to be raifed, a lefs power than the weight will ferve for that purpofe, unlefs it pufhes the body directly againft the plane (as in the direction WT) or draws the body away from the plane (as from W towards *e*, *t*, or L) or in any direction on that fide of the line E *e*.

The direction in which the body can moft eafily be drawn or pufhed up the plane is the line W *w* M, parallel to the plane, and paffing through the centre of the weight; for whether the power divides a plane *k* K (in a direction perpendicular to it) along the line WM, or the power P*e* (by its defcent to P) draws it in the fame line, the velocity of the power will be equal to the line W *w*, the fpace defcribed by the centre of gravity of the weight, whilft the fame weight rifes only the perpendicular height ZB (=*n* W) or has the faid line properly to exprefs its velocity. If the body was a cylinder, as a rolling ftone, and the plane T *t* were to pafs through the gudgeons or axis of the faid ftone; it is evident that the cafe would be the fame; and as the weight P has its rope running over the roller (or upper pulley) M, the line P *e* P will be the velocity of the power. Therefore in this cafe the weight (if kept in æquilibrio) will be to the power, as W *w* (= TB) to *w* Y (= BZ) or as the hypothenufe AB is to the perpendicular BC, which (by Eucl. 4. 6.) are in the fame proportion; and confequently, if the power be never fo little increafed, it will draw the weight up the plane.

That the power acts with the greateft advantage, whilft it draws in the line of direction W *w* (parallel to the plane) is evident, becaufe if one end of the faid plane of direction remaining fixed at W, the other fhould move towards B, or beyond it, then the body would be partly drawn againft the plane, and therefore the power muft be increafed in proportion to the greateft difficulty of traction: and if the end *w* of the line abovementioned fhould be carried to D, or beyond it, the power muft be alfo increafed, inafmuch as it endeavours to lift the body off from the plane.

If the power draws in a line of direction WB (*fig.* 3.) parallel to the bafe of the plane; then, in order to keep the weight W in æquilibrio by the power Π, the faid power muft be to the weight, as ZB to ZT, or as the perpendicular BC to the bafe AC of the triangle ACB. For if we fuppofe the pulley R at fo great a diftance from W, that the line of direction WR may not fenfibly alter its horizontal pofition, whilft the body W rifes the height BZ, in fuch manner that Π ϖ (= WY, and not W *w*) will be the velocity of the power. So that the velocity of the power to that of the weight will not be as the hypothenufe to the perpendicular, as in the former cafe, but as the bafe to the perpendicular in the triangle ACB.

If the powers be increafed juft enough to overcome the friction of the plane and draw up the body W, let the pully R be lifted up gradually to *r*, fo as to keep the line WR parallel to itfelf till it comes to *w r*, and the power will be defcended to π, when the weight is come to *w* B. But Ππ, together with the diftance R *r*, is equal to Π ϖ, or WY, &c. And the traction is conftantly made in the angle WBT, in this cafe.

Inclined *Towers*, thofe whofe tops hang fo far over, as to appear dangerous to people walking below; fuch as that of Boulogna, built in the year 1110, and that of Pifa in the year 1173. Now the reafon why fuch towers do not fall, is owing to their centres of gravity being fupported.

INCLINERS, or Inclined *Planes*, in dialling. See the article Dial.

INCOGNITO, a term applied to a perfon who would not be known.

INCOMBUSTIBLE, whatever cannot be confumed by fire, as metals, ftones, and cloth made of lapis amianthus, &c.

INCOMMENSURABLE, in arithmetick and geometry, when two numbers or quantities, &c. compared to each other, have no common meafure, or when no third quantity can be found that is an aliquot part of both; or when thofe quantities, &c. are not to one another as unity to a rational number, or as one rational number to another. The fide of a fquare is incommenfurable to the diagonal, as is demonftrated by Euclid: but it is commenfurable in power, the fquare of the diagonal being equal to twice the fquare of the fide by Euclid 1. 48. And this theorem of the incommenfurablenefs of the fide of the fquare to its diagonal was fo famous among the ancients, efpecially Plato and Ariftotle, that the former lookt upon him as a beaft, and no man, who fhould be ignorant of it.

INCOMPATIBLE, whatever cannot confift with another thing without deftroying it; as equal degrees of cold and heat in the fame fubject.

INCOMPOSITE Numbers, the fame with what Euclid calls prime numbers, where unity is the only aliquot part to meafure them by.

INCONTINENCE, *Incontinentia*, befides the moral fenfe, denotes, in medicine, an inability in any of the organs to retain what fhould not be difcharged without the concurrence of the will. It moft frequently implies an involuntary difcharge of urine, the bladder in men being fometimes fo debilitated that it flows from them involuntarily. This may proceed from a ftone in the bladder, or a palfy in the fphincter. In the firft cafe, the only remedy is lithotomy, or an extraction of the ftone. Nor is lithotomy infallible; for that operation frequently caufes the diforder. But, if it proceeds from a weaknefs of the neck of the bladder, ftrengthening and nervous medicines are moft likely to remove it.

INCORPORATION, the mixing the particles of different bodies or confiftencies fo together, as to make an uniform compofition or confiftence of the whole, whereby the ingredients mixed cannot be diftinguifhed in any of their particular qualities. This is much the fame with impaftation, as pills, bolufes, troches, and plafters.

INCORPOREAL, the fame with fpiritual, a thing which has no body, as God, the foul of man, &c.

INCORRUPTIBLE, whatever cannot be corrupted; thus, all ſpiritual ſubſtances, and likewiſe glaſs, ſalt, &c. may be called incorruptible.

INCRASSANTS, or INCRASSATING *Medicines*, *Incraſſantia*, in phyſick, ſuch as reduce the too fluid blood and juices to a proper conſiſtence, and due condenſation.

INCRASSATING, the act of rendering fluids thicker by the mixture of other leſs fluid particles, or by expelling the finer particles, and compinging and bringing the groſſer nearer together.

INCREMENT and DECREMENT, the increaſe and decreaſe of a quantity. See SERIES.

INCRUSTATION, the coating of a wall, either with gloſſy ſtones, ruſticks, marble, pottery, or ſtucco-work, and that either equably, or in pannels and compartments.

INCRUSTATION, in ſurgery, the inducing of a cruſt or eſcar upon any part.

INCRUSTED, or INCRUSTATED COLUMN, is a column conſiſting of ſeveral pieces or ſlips of ſome precious marble maſticated or cemented round, a mould of brick or other matter.

INCUBATION, the action of a hen or other fowl brooding her eggs.

INCUBUS, or EPHIALTES, in phyſick, commonly called the night-mare, a diſorder under which the patient cannot ſtir himſelf, but with the utmoſt difficulty; is ſeized with a numberleſs and ſenſe of weight, with a dread of ſuffocation, and an oppreſſion, as from ſome body falling ſuddenly upon him.

The word is derived from the Latin, *incumbo*, in regard the patients fancy they feel ſomething aſcending and ſitting upon their breaſt.

This appears to be a diſeaſe of ſtricture, from the ſenſe of weight attending it; and of the chronical kind, from the length of time; and it is not always without danger, for ſome have died under the violence of the ſuffocation. The incubus is of a bad kind, when it ſeizes the patient, though awake, in the night; but worſt of all, when, after moleſting him in his ſleep, it leaves him to awake under a cold ſweat and palpitation of the heart. Such as have been long and often ſubject to it, have reaſon to apprehend ſome dangerous diſtempers of the head, as a vertigo, apoplexy, &c.

The cure conſiſts in evacuations by phlebotomy and catharticks. The patient muſt be kept to a thin diet, and avoid all flatulent food.

INCUBUS, a name given by the pagans to certain demi-gods, formerly called fawns and ſatyrs.

INCUMBENT, in law, a clerk reſident in his benefice with cure, ſo called, becauſe he ought to bend his ſtudy to diſcharge the duty of ſuch cure.

INCURVATION, the act of bending a bone or other body from its natural ſhape.

INCUS, in anatomy, a ſmall bone in the internal ear. See EAR.

INDEFEIZIBLE, or INDEFEAZABLE, in law, what cannot be defeated or annulled.

INDEFINITE, indeterminate, that which has no certain bounds, at leaſt, aſſignable by the human mind. Deſcartes uſes the word, inſtead of infinite, in numbers and quantities, to ſignify a number ſo great, that an unit cannot be added to it; and a quantity ſo great, as not to be capable of any addition.

INDEFINITE, in the ſchools, alſo denotes a thing that has but one extreme; for inſtance, a line drawn from any point and extended infinitely, as alſo eternity a parte ante, or eternity a parte poſt.

INDEFINITE, in grammar, denotes ſuch nouns, pronouns, verbs, participles, articles, &c. which are left in an uncertain indeterminate ſenſe, and not fixed to any particular time, or other circumſtance.

INDELIBLE, that which cannot be effaced.

INDEMNITY, an act by which one promiſes to guarantee, or ſave harmleſs, ſome other perſon from any loſs or damage that might accrue to him on any particular account.

INDENTED, INDENTEE, in heraldry, when the outline of a border, ordinary, &c. is notched like the teeth of a ſaw.

INDENTURE, in law, a writing which comprizes ſome contract between two at leaſt, being indented at top, which correſponds to a counter-part, containing the double of the ſame contract. It differs from a deed-poll, in that this laſt is a ſingle deed, and is not indented.

INDEPENDENTS, a ſect of Proteſtants in Britain and Holland, ſo called from their independency on other churches, and their maintaining that each church or congregation has ſufficient power to act and perform every thing relating to religious government within itſelf, and is no way ſubject or accountable to other churches or their deputies.

They therefore diſallow parochial and provincial ſubordination, and form all their congregations upon a ſcheme of co-ordinancy. But though they do not think it neceſſary to aſſemble ſynods; yet if any be held, they look on their reſolutions as prudential councils, but not as deciſions to which they are obliged to conform.

INDETERMINATE, in geometry, a quantity either of time or place, which has no certain or determinate bounds.

INDETERMINATE, or INDETERMINED *Problem*, that whereof there may be ſeveral, or even an infinite number of ſolutions.

INDEX, in anatomy, denotes the fore-finger. See the article HAND.

The days on which future criſes may be preſaged, are likewiſe called dies indices.

INDEX, in arithmetick, is the ſame with what is otherwiſe called the characteriſtick, or exponent of a logarithm, being the firſt number ſtanding on the left hand of the point: it ſhews how many places the abſolute number belonging to the logarithm conſiſts of, and of what nature it is, whether an integer or a fraction. As in this logarithm, 2.523421, 2 ſhews that the abſolute number anſwering to it conſiſts of three places, being always one more than the index. If the abſolute number be a fraction, then the index of the logarithm hath a negative ſign. See LOGARITHM.

INDEX of a globe, a little ſtile or gnomon fitted on to the north pole, and turning round with it, pointing to certain diviſions in the hour-circle.

INDEX, or INDICE, a congregation at Rome, &c. whoſe buſineſs is to examine books, and to put ſuch as they think fit to prohibit the reading and ſelling of, into an index. The catalogues themſelves of theſe prohibited books are called indices or expurgatory indices: among which ſome are condemned purely and abſolutely, and others, only till they be corrected. The moſt conſiderable of all the indices is that of Sottomayor, which was made for all the ſtates ſubject to the king of Spain, and comprehends all the other indices, coming down as low as 1667.

INDIA PROPER, or HITHER INDIA, a large peninſula in Aſia, bounded on the north by Uſbec Tartary, and Thibet; on the eaſt, by another part of Thibet, the kingdom of Aſem, Ava, and Pegu; on the ſouth, by the bay of Bengal, and the Indian ocean; and by the ſame ocean and Perſia on the weſt: ſituated between 66° and 92° of eaſt longitude, and between 7° and 40° of north latitude; being about 2000 miles in length from north to ſouth, and 1500 miles in breadth from eaſt to weſt where broadeſt; though the ſouthern part of the peninſula is not 300 miles broad. All the country within theſe limits is either ſubject or tributary to the great Mogul. It is frequently called Indoſtan, a name ſuppoſed to be derived from the river Indus, on its weſtern frontiers: it is alſo called the Mogulſtan, from the imperial family now upon the throne, who trace their pedigree from Tamerlane a Mogul Tartar.

The produce of this country, and what the Europeans import from thence, is chiefly chints, callicoes, muſlins, ſome ſilk, pepper, and diamonds, which are purchaſed by moſt nations with ſilver; but the Dutch frequently barter ſpices for them, which makes the India trade doubly advantageous to them.

INDIA, beyond the Ganges, is a country bounded by Thibet and Boutan on the north; by China, Tonquin, and Cochin-China on the eaſt; by the Indian ocean on the ſouth; and by the hither India, the bay of Bengal, and the ſtraits of Malacca, on the weſt: it is ſituated between 92° and 104° of eaſt longitude, and between the equator and 30° of north latitude: being near 2000 miles in length from north to ſouth, but of a very unequal breadth; in which limits are comprehended the kingdoms of Aſem, Ava, Pegu, Laos, Siam, Cambodia,

bodia, and Malacca, governed by as many Indian princes; only the Dutch have uſurped the dominion of Malacca. In this country there are a vaſt number of elephants, and conſequently a great deal of ivory; our merchants alſo meet with gold and precious ſtones, canes, opium, and ſuch other articles as are uſually found within the tropics.

INDICATION, *Indicatio*, in phyſick, denotes the pointing out or diſcovering what is fit to be done, and what means are fit to be applied in any caſe, from a knowledge of the nature of the diſeaſe and the virtues of medicines.

INDICATIVE, in grammar, the firſt mood of conjugating verbs, ſhewing either the time preſent, paſt, or future.

INDICTION, the convoking an eccleſiaſtical aſſembly, or council; it is alſo applied to the ſeveral ſeſſions of the ſame council.

INDICTION, in chronology, a kind of epocha, or manner of reckoning time among the Romans, containing a cycle of 15 years. There are three kinds of indiction mentioned in authors: the indiction of Conſtantinople beginning on the firſt of September; the imperial or Cæſarian indiction on the 14th of September; and the Roman or papal indiction, which is that uſed in the pope's bulls, and begins on the firſt of January. Since Charlemaigne made the popes ſovereigns, they dated their acts by the year of the indiction, before which time they dated them by the years of the emperors.

INDICTMENT, in law, a bill of complaint, formally drawn up, in behalf of the commonwealth, and exhibited as an accuſation of one for ſome offence. criminal or penal, before a jury, and by their verdict preſented to a judge or officer that has power to certify the puniſhment which the law appoints on ſuch criminals, whereupon execution enſues accordingly. This accuſation the jury do not receive, till the party that offereth the bill, appearing, ſubſcribe his name, and prefer his oath for the truth of it. Indictment is always at the ſuit of the king, and differs from an accuſation, in that the preferrer is no way tied to the proof thereof upon any penalty, if it be not proved, except there appear a conſpiracy.

INDIGESTION, *Indigeſtio*, a want of due coction, either in the food, the humours of the body, or excrements.

INDIGO, in commerce, a preparation of the juice of a plant, called by ſome anil, the characters of which are theſe: the cup is plane; the alæ of the flower are connivent at their upper edges, and are of the ſame figure with the vexillum. It is one of the *diadelphia decandria* claſs of Linnæus. This plant grows to about two feet high, with roundiſh leaves; and is a native of both the E. and W. Indies. Chooſe the indigo of Serquiſſe in flat cakes, of a moderate thickneſs, neither too ſoft nor too hard, of a deep violet colour, light, and ſuch as ſwims on water; and when broken, has no white ſpots in it; and, laſtly, ſuch as is copperiſh or rediſh on being rubbed with one's nail, and has the leaſt duſt and broken pieces in it.

The uſe of the indigo is for the dyer and laundreſſes, ſerving the laſt to put among their linen. The painters uſe it to grind with white for painting in blue; for if it is uſed alone and neat, it turns black; ground with yellow, it makes a green: ſome confectioners and apothecaries prepoſterouſly uſe this to colour ſugars, with which to make conſerves and ſirup of violets, by adding ſome orris. For the manufacturing of indigo, ſee MANIOCK and the *plate* there referred to.

INDIVIDUAL, *Individuum*, in logick, a particular being of any ſpecies, or that which cannot be devided into two or more beings equal or alike.

INDIVISIBLE, among metaphyſicians. A thing is ſaid to be abſolutely indiviſible, that is a ſimple being, and conſiſts of no parts into which it may be divided. Thus God is indiviſible in all reſpects, as is alſo the human mind, not having extenſion or other properties of body.

INDIVISIBLE *Secundum quid eſt*, indiviſible with reſpect to what is now, is a ſubſtance which, though it conſiſts of parts into which it may be divided, yet never can be ſo divided as to remain the ſame: thus a meaſure or number is ſaid to be indiviſible, for if from a foot-line, for example, any thing is deducted, it is no more a foot-line; and if from the number three any thing is ſubtracted, it is no longer the ſame number. See ARTICLE

INDIVISIBLES, in geometry, the elements or principles into which any body or figure may be ultimately reſolved; which elements are ſuppoſed infinitely ſmall: thus a line may be ſaid to conſiſt of points, a ſurface of parallel lines, and a ſolid of parallel and ſimilar ſurfaces; and then, becauſe each of theſe elements is ſuppoſed indiviſible, if in any figure a line be drawn through the elements perpendicularly, the number of points in that line will be the ſame as the number of elements; whence we may ſee that a parallelogram, priſm, or cylinder, is reſolvible into elements or indiviſibles, all equal to each other, parallel and like to the baſe; a triangle into lines parallel to the baſe, but decreaſing in arithmetical proportion, and ſo are the circles which conſtitute the parabolick conoid, and thoſe which conſtitute the plane of a circle, or ſurface of an iſoſceles cone. And this way of conſidering things was called methodus indiviſibilium, firſt made uſe of in geometry by Kepler, and then further extended by Cavalerio, Gregory à S. Vincentio, and our countryman Barrow, preceptor to the great Sir Iſaac Newton, who, with a ſagacity peculiar to himſelf, extracted from thence his fluxions, ſince the invention of which it has been laid aſide.

INDORSEMENT, in law, any thing written on the back of a deed, as a receipt for money received. See BILL.

INDUCEMENT, in law, ſignifies what may be alledged as a motive: and, in our law, it is uſed ſpecially in ſeveral caſes; as there is an inducement to actions, to a traverſe in pleading, and to an offence committed, &c.

INDUCTION, in law, is putting a clerk or clergyman in poſſeſſion of a benefice or living to which he is collated or preſented.

INDULGENCES, in the Romiſh church, are a remiſſion of the puniſhment due to ſins, granted by the church, and ſuppoſed to ſave the ſinner from purgatory. Clement VI. in his decretal, which is generally received by the church of Rome, declares, that our Saviour has left an infinite treaſure of merits, ariſing from his own ſufferings, beſides thoſe of the bleſſed virgin and the ſaints; and that the paſtors and guides of the church, and more eſpecially the popes, who are the ſovereign diſpoſers of this treaſure, have authority to apply it to the living, by virtue of the keys, and to the dead, by way of ſuffrage, to diſcharge them from their reſpective proportions of puniſhment, by taking juſt ſo much merit out of this general treaſure, as they conceive the debt requires, and offering it to God.

It was the great abuſe of indulgencies that contributed not a little to the firſt reformation of religion in Germany, where Martin Luther began firſt to declaim againſt the preachers of indulgencies, and afterwards againſt indulgencies themſelves: for ſince that time the popes have been more ſparing in the exerciſe of this power; however, they ſtill carry on a great trade with them in the Indies, where they are purchaſed at two rials a piece, and ſometimes more.

INDULT, in the church of Rome, the power of preſenting to benefices granted to certain perſons by the pope.

INDULTO, a duty, tax, or cuſtom, paid to the king of Spain, for all ſuch commodities as are imported from the Weſt-Indies in the galleons. See GALLEON.

INERTIA *of Matter*, in philoſophy, is defined by Sir Iſaac Newton to be a paſſive principle by which bodies perſiſt in their motion or reſt, receive motion in proportion to the force impreſſing it, and reſiſt as much as they are reſiſted. It is alſo defined by the ſame author to be a power implanted in all matter, whereby it reſiſts any change endeavoured to be made in its ſtate.

This power then coincides with the *vis reſiſtendi*, or power of reſiſting, whereby every body endeavours, as much as it can, to perſevere in its own ſtate, whether of reſt or uniform rectilinear motion; which power is ſtill proportionable to the quantity of matter in any body: for ſince natural bodies conſiſt of a maſs of matter, that, of itſelf is not able to induce any change in its ſtate, if bodies were once at reſt, it is neceſſary that they ſhould always remain in that ſtate of reſt, unleſs there is applied a new force to produce motion in them: but if they were in motion, the ſame energy or force would always preſerve the motion; and therefore bodies would always retain their motion, and would always proceed forward in the ſame right-line with the ſame tenor, ſince they cannot of themſelves acquire either reſt or a retardation, or a change of their direction to turn on one ſide or the other.

Since, according to this law, a body once in motion

always continues in that motion, the philosophers ask, why all projectiles lose by degrees their motion, why do they not proceed in infinitum? if motion did not of its own nature decay, a stone thrown at the beginning of the world, would by this time have gone through an immense and almost infinite space. And so indeed it would, if its motion had been in vacuo, or in free spaces, and without any gravity. But since all projectiles are carried either through the air, or on the rough surfaces of other bodies, they must be necessarily retarded: for since all bodies in motion must drive and thrust out of its place the resisting air, or overcome the roughness of the superficies upon which they are moved, they will lose all that force and motion that is constantly employed in overcoming these obstacles, and consequently the motion of projectiles will be continually diminished; but if there was no resistance in the medium, no roughness in the superficies on which they were moved, no gravity that continually forces the bodies toward the earth, motion would always continue the same, without any retardation at all. So in the heavens, where the medium is exceedingly rare, the planets do continue their motions for a very long time; and upon ice, or any other very smooth surface without roughness, heavy bodies in motion are not soon brought to rest.

INFALLIBLE, what cannot deceive, nor be deceived; thus God alone is infallible; but papists say, the church is infallible in her decisions as to faith and manners; but where to place this infallibility, whether in the pope and a general council, or in a general council without the pope, as in the council at Constance, or in the pope without a general council, when he speaks ex cathedra, they cannot determine.

INFAMOUS, in general, denotes something notoriously contrary to virtue or honour.

INFAMOUS, in law, denotes a person of no repute in the world. There are two kinds of infamy; some persons being infamous *de jure*, or stigmatized by publick judgments; others are infamous *de facto*, as being of a scandalous profession, as a catchpole, hangman, informer, &c.

INFANT, among physicians, implies a young child. The illustrious Hoffman has given us the following regimen for infants.

As soon as the child is brought into the world, it ought immediately after the ligature, and cutting of the umbilical vessels, to be washed in a warm bath prepared of water alone, or a mixture of wine and water. The midwife too should, if there appear any thing ill formed by the birth, fashion it better, and restore it to its natural shape. But, above all, she must observe whether the child be strong and robust, or weak and infirm, which last may be discovered from its voice and respiration. If the new-born infant be found to be preternaturally weak, it should be washed with warm wine, rubbing it gently and breathing strongly into its mouth, after chewing aromaticks, or giving it a small quantity of Rhenish wine, or cinnamon-water.

But, as the tender infant must be secured from the injuries of the air by soft linen, and commodious bandages, great caution is requisite, lest some damage be done, and a foundation laid for future disorders.

The next care is, that infants be seasonably purged. For this purpose Providence has kindly furnished the mother at first with thin sweetish milk termed colostrum, whose deterging and diluting quality opens the body much better and safer than the most select evacuants.

If the mother's nipples be too small, or too thick, or if the mother have not a mind to give suck, or have not milk soon enough, it is much better for the first four and twenty-hours that the body should be freed by other proper laxatives from its meconium, than immediately after the birth to deliver the infant to a robust fat nurse to be suckled.

Milk deservedly constitutes the principal and universal aliment, because it supplies both meat and drink at the same time, is grateful to the stomach, and for this purpose was it wisely ordered by the Creator, that healthy women, immediately after their delivery, should accumulate a sufficient quantity of it in their breasts. The milk of nurses should be pure and temperate, which is best obtained, if they observe an exact method of diet.

A hired nurse should be healthy, in the flower of her age, from 20 to 30, rather lean than fat, of good morals, composed in mind, neither melancholick, passionate, nor a drunkard; nor, lastly, let her milk be too stale. Further, let her observe a regular diet; and not pass from a hard and sparing food, to one which is delicate and plentiful, but rather accustom herself to it by degrees. If she is deprived of sleep in the night, let her repair that loss in the morning, yet so as not to indulge it too far.

The quantity of milk to be sucked cannot be exactly determined; but the general practice is to give the breast for the month every two hours; after three or four months, six or seven times, and at last only twice or thrice in a day, till the year is expired.

If the milk alone be not sufficient to support the child, there are other aliments contrived for this purpose suited to various countries and people; the most common are paps made of crumbs of bread, &c. But I very much doubt, whether infants, especially the very tender ones, are capable of dissolving perfectly this viscid food, and rather think that they pave the way for obstructions of the viscera and mesentery. Nor can I approve of that pernicious custom of giving children pap rolled first in the nurse's mouth, and mixed with her saliva; because, by such mastication, not only the most subtile part of the pap is sucked out, but also any infection of the saliva and corrupted teeth are easily communicated to the infants.

In the space of a year, or a little more, when children have arrived at such a habit as to digest other aliments, they may be weaned. But, at that time a large quantity and variety of food, and aliments of a hard digestion, should be avoided. I have found nothing more useful for the prevention of the diseases of infants, than to give often to the nurse and child, in a large quantity, infusions of herbs which sweeten the blood, made with water.

To prevent the coagulation of the milk in the stomach and duodenum, absorbent powders are extremely efficacious; and sometimes gentle laxatives, if necessary, should be interposed, by which the injuries from coagulated milk are likewise in a great measure prevented. See WEANING.

INFANT, in law, a person under the age of one and twenty years; and before that age any deed or writing may be nulled; he may purchase without the consent of another, but at full age may wave or stand to it, as he likes, as may his heirs. Coke on Littleton says, sect. 405, that an infant shall not be punished till the age of 14, which he takes to be the age of discretion; nor shall the act of an infant be imputed to him, no not in case of high treason, till this age: though others say, that an infant eight years of age, or upwards, may commit homicide and be hanged for it, if by any other act it appear that he had knowledge of good and evil; for here malitia supplebit ætatem. At 14 he may, before a judge, choose new guardians, when he will, and consent to marriage; which last a female may do at 12.

INFANT, also in Spain and Portugal, is an appellation attributed to the king's sons, as *infanta* is to the daughters.

INFINITE, that which has neither beginning nor end: in which sense God alone is infinite. See GOD.

Infinite is also used to signify that which has had a beginning, but will have no end, as angels and human souls. This makes what the schoolmen call *infinitum a parte post*; as, on the contrary, by *infinitum a parte ante*, they mean that which has an end but had no beginning.

INFINITE, in mathematicks, are such quantities as are either greater or smaller than any assignable one, being the same with indefinite or indeterminate, to which no certain limits are prescribed

The doctrine of infinites has given occasion for many disputes; but the true state of the case is this: So long as we reason upon wrong suppositions, we must never expect to arrive at truth; but the nearer our suppositions are to truth, the nearer will be the conclusion; and if these suppositions be infinitely near the truth, the errors in the conclusion will be infinitely small, which being at last thrown out of the account, the conclusion will be the same as if we had proceeded upon principles accurately true. This is the true rise of infinitely small quantities in all mathematical computations, and the true reason for rejecting them, when the operation is over; but it may be

be reasonably demanded, How do we know that these infinitely small errors in the conclusion arise from similar errors in the premises? And the answer is, because these two sorts of errors have so mutual a dependence one upon another, that one cannot be made to vanish, but the other will necessarily vanish with it. If it be further demanded, What the wrong suppositions are from which these infinitely small errors spring? I answer, in the first place, the supposing magnitudes to have quantity, which in reality have none at all, but have entirely lost it, either by running into infinity on the one hand, or into nothing on the other. Thus, if we suppose the point D to actually coincide with the angular point C (*plate* XLI. *fig.* 3.) the line D C will not only comparatively, but absolutely be equal to nothing; that is, it will be no line at all, nor can any use be made of it: but by allowing the said line to have some quantity, though extremely small, or less than any that can be assigned, we tacitly suppose the point D not to be actually in the angular point C, but infinitely near it.

A quantity, after it is reduced to nothing, ceases to be a quantity; and if o have no quantity, neither can its reciprocal $\frac{1}{0}$, or any magnitude expressed by it, be said to have any: but the reciprocal of nothing signifies a magnitude infinitely great in the strictest sense of the word, and can no more be said to have quantity than absolute nothing can; and to compare such magnitudes in respect of their quantity, which actually have none, is contrary to the definition both of ratios, and the object of proportion: nay, I know not whether the greatest part if not all the difficulties that are said to attend the idea of infinity, and our inability to comprehend it, ought not rather to be charged upon the absurdity of comparing things together which in their own natures are incapable of all comparison. It is said indeed that infinite parallelopipeds, standing perpendicular upon finite bases, and upon the same plane, are in proportion as their bases; which is true; but this is not comparing magnitudes in respect of the quantity they have not, but in respect of the quantity they have; one of these parallelopipeds may be said to be broader or thicker than another, though not higher. Thus, if r be any quantity whereof the multiplies $2r$ and $3r$ are taken, $2r$ may be said to be to $3r$ as 2 to 3, whether r be finite or infinitely great or small; nay, though r should signify an impossible quantity; as $\sqrt{-1}$, $\sqrt{-2}$, &c. but then the quantity of the proportion does not depend upon the quantity r, but upon the coefficients 2 and 3: but I must here take notice however, that if r be actually infinite, I mean in the strictest sense of the word, by $2r$ and $3r$ must then be meant, not quantities twice or thrice as big as r, in the same respect wherein it is infinite, but r twice or thrice taken, which is no way absurd; for if it be possible for any one infinite quantity to exist, that is not every way infinite, it will be as possible for others to exist of the same kind, independently of the former: a parallelopiped, that is infinitely extended only as to its length, and that both forwards and backwards, may however receive any addition, or be increased or diminished in any proportion in respect of its finite dimensions, but not in respect to its infinite dimensions; and this is all the proportion I can conceive infinite quantities capable of. See *Philosophical Transactions*, N°. 195.

That lines or quantities may continually decrease, and yet never become nothing, may be easily shewn in the following manner.—Let M C L K (*fig.* 4.) be an indefinite right line, P a given point out of that line; from P draw P C B perpendicular to M C L K, and of any length at pleasure; from P draw P E, P F, P I, &c. observing always to make the segments D E, T F, L I, &c. of those lines constantly equal to C B: from the points E, F, I, &c. let fall upon M C K the perpendiculars E G, F H, I K, &c. It is very evident that each following perpendicular is shorter than any of the preceding ones; and it is as evident, that were the number of them ever so great, the last perpendicular would be of a finite length, because its corresponding hypothenuse does, by the hypothesis, form a finite angle with the indefinite line M C L K, and does also constantly rise above it.

Mathematicians, and more especially those who understand this subject, are, generally speaking, reserved enough upon it, and chuse rather to be deficient than redundant in their expressions upon these occasions; not from any diffidence in their own principles, but knowing very well how liable matters of this nature are to be drawn into disputes by such as lie upon the catch, and make it their chief business to oppose the truths which they themselves could never have discovered, nor perhaps will ever be able to understand.

INFINITE *Series*. See SERIES.

INFINITIVE, one of the moods that serve for conjugating of verbs, and expresses things in a loose indefinite manner, as docere, to teach.

In most languages ancient and modern the infinitive has a peculiar termination, as τύπτειν in the Greek, scribere in the Latin, ecrire in the French, scrivere in the Italian, &c. In this the English is defective, being obliged to have recourse to the particle *to*, except when two or more infinitive moods follow one another.

The using a number of infinitives successively is a common fault in language; but, where the infinitives have no dependance on each other, they may be used elegantly enough.

INFINITY, the quality by which any thing is denominated infinite. Finite and infinite are looked upon as the modes of quantity, and primarily attributed to things that have parts, and are capable of increase or diminution, by the addition or subtraction of any the least part. Such are the ideas of space, duration, and number. This idea we apply to the supreme Being primarily, in respect of his duration and ubiquity; more figuratively to his wisdom, power, goodness, and other attributes which are properly inexhaustible and incomprehensible. We have no other idea of this infinity but what carries with it some reflection on the number or extent of the acts or objects of God's power and wisdom, which can never be supposed so great, that these attributes will not always surmount, though we multiply them in our thoughts with the infinity of endless number.

We come by the idea of infinity thus: Every one that has any idea of any stated length of space, as a foot, &c. finds that he can repeat that idea, and join it to a third, and so on, without ever coming to an end of his additions. From this power of enlarging his idea of space, he takes the idea of infinite space. And in the like manner we come by the idea of eternity.

We are carefully to distinguish between the idea of infinity of space, and the idea of a space infinite. The first is nothing but a supposed endless progression of the mind over any repeated idea of space: but to have actually in the mind the idea of a space infinite is to suppose the mind already passed over all those repeated ideas of space, which an endless repetition can never totally represent to it; which carries in it a plain contradiction.

To make this plainer, the infinity of numbers easily appears to any one that reflects on it; but, how clear soever this idea may be, there is nothing yet more evident than the absurdity of the idea of an actual infinite number.

INFIRMARY, a place appropriated for the cure or nursing of the weak and sickly.

INFLAMMATION, *Inflammatio*, phlegmon, in medicine, a disorder so called, as it produces effects similar to those of fire. An inflammation is a pressure and attrition of the red arterial blood stagnating in the smallest canals, produced by the motion of the rest of the blood, thrown into violent and forcible commotions by means of a fever. Its seat is every part of the body in which there are reticular distributions of arteries, or the origins of lymphatick and arterial vessels.

In the cure of an inflammation by resolution the following intentions are to be pursued: 1. The farther injury of the vessels is to be prevented. 2. The injury already done them is to be removed. 3. Fluidity and mildness are not only to be restored to, but also preserved in the obstructing matter. 4. Or, if this end cannot be obtained, it is to be forced back into larger vessels.

The further injury of the vessels is prevented, first, by removing or correcting the known productive causes of the inflammation; and, secondly, by lessening the impetus of the arterial blood by means of venesection and purging.

The second intention is obtained in two manners, either by so relaxing the obstructed vessels, that they may transmit through their extremities the obstructing molecules into the veins; or by so constricting the vessels by means of refrigerants, repellents, and astringents, that

that the obſtructing matter may be repelled from the narrow to the large parts of the veſſels. But theſe refrigerants, repellents, and aſtringents are only ſometimes, not always beneficial. In ſlight inflammations they are often highly ſerviceable, if applied in the beginning. But when the diſeaſe is of longer ſtanding, the inflammatory obſtructing matter impacted in the veſſels is not capable of being ſo eaſily repelled. In this caſe relaxing medicines are of all others the moſt proper. With theſe anodynes, or ſuch medicines as allay pain may alſo be mixed. The fluidity of the obſtructing matter is produced by attenuating and diluting it, and by reſtoring the elaſtick oſcillations to the veſſels.

Point of INFLECTION. When a curve A F K (*plate* XLI. *fig.* 5.) is partly convex, and partly concave, to a right line A B or point B; the point F dividing the convex from the concave part, or the end of the one, and the beginning of the other, is called the point of inflection, when the curve being come to F, continues its courſe towards the ſame parts; and the point of retrogreſſion, when the curve returns back again towards the place of its beginning.

Let us ſuppoſe the curve A F K to have the right line A B as a diameter, and the ordinates P M, E F, &c. parallel to each other. Now if you draw the ordinate F E from the point F, and the tangent F L; alſo another ordinate M P from the point M in the concave part A F of the curve, likewiſe a tangent M T; then it is evident that, in curves having a point of inflection, while the abſciſs A P conſtantly increaſes, the part A T of the diameter, intercepted between the vertex of the diameter A and the point T, where the tangent meets the diameter, does likewiſe increaſe until the point P falls in E, after which it continually decreaſes; therefore A T muſt become a maximum A L, when the point P falls in E the point ſought.

In thoſe curves that have a point of retrogreſſion, the part A T continually increaſes, and the abſciſs A P till the point T coincides with L, and afterwards it continually decreaſes; whence A E muſt be a maximum, when the point T coincides with L. Now call A E, x; E F, y; then will A L $= \frac{y\dot{x}}{\dot{y}} - x$, and the fluxion of this will be $\frac{\dot{y}\dot{y}\dot{x} - y\dot{x}\ddot{x}}{\dot{y}\dot{y}} - \dot{x}$, ſuppoſing $\dot{x}$ invariable; which (being divided by $\dot{x}$ the fluxion of A E) muſt be equal to nothing, or infinite: whence $-\frac{y\ddot{y}}{\dot{y}\dot{y}} = 0$, or infinity; and ſo multiplying by $\dot{y}\dot{y}$, and dividing by $-y$, there comes out $\ddot{y} = 0$, or infinite. Now with this laſt expreſſion, and the general equation of a curve, the point of inflection or retrogreſſion F may be found: for the nature of the curve A F K being given, we ſhall have a value of $\dot{y}$ in $\dot{x}$, and putting that value into fluxions, with $\dot{x}$ conſtant, we ſhall obtain a value of $\ddot{y}$ in terms of $\dot{x}\,\dot{x}$; which being made equal to 0, and afterwards to infinity, by means thereof, in either of theſe ſuppoſitions, we may find A E ſo expreſſed, that its correſpondent ordinate E F ſhall interſect the curve in the point of inflection or retrogreſſion F.

INFLEX LEAF, among botaniſts, one whoſe point bends inward towards the ſtem of the plant.

INFORMER, a perſon that informs againſt, or proſecutes another, upon any penal ſtatute.

INFORMIS, ſomething irregular in its form or figure.

INFUNDIBULUM, in anatomy, a ſmall conduit, ſo called from its reſemblance to a funnel, which pierces the dura mater upon the baſis of the ſkull, and ſinks into the ſubſtance of the glandula pituitaria. The pelvis is the infundibulum of the kidnies.

INFUNDIBULIFORM, a name given by botaniſts to thoſe flowers whoſe corollæ are monopetalous and funnel-ſhaped, having a narrow tube at one end, and gradually widening towards the limb or mouth. There are two kinds of theſe flowers, one the figure of a cone, and the other plain or flat, ſomewhat like a ſaucer, and thence called hypocrateriform; of the firſt kind is bugloſs, and of the laſt form is turnſole, with many other genera.

INFUSION, in pharmacy, a method of obtaining the virtues of plants, roots, &c. by ſteeping them in a hot or cold liquid.

INGANNO, in muſick, is when having done every thing proper for ending a cadence, a mark of ſilence is placed inſtead of the final, which the ear naturally expects, and is deceived. See CADENCE.

INGOT, a maſs of gold or ſilver, melted down and caſt in a mould, but not coined or wrought. See GOLD and SILVER.

INGREDIENTS, in pharmacy, whatever ſimple medicines enter the compoſition of a compound one.

INGRESS, in aſtronomy, ſignifies the ſun's entering the firſt ſcruple of one of the four cardinal ſigns, eſpecially Aries.

INGRESS, EGRESS, and REGRESS, in law, words frequently uſed in leaſes of lands, which ſignifies a free entry into, a going out of, and returning from ſome part of the premiſes leaſed to another.

INGROSSER, one who buys up great quantities of any commodity, before it comes to market, in order to raiſe the price.

INGROSSER alſo ſignifies a clerk or perſon who copies records, deeds, or other inſtruments of law, on ſkins of parchment.

INGUEN, in anatomy, the ſame with what is otherwiſe called groin, or pubes.

INGUINAL, in anatomy, &c. any thing belonging to the groin. Hence,

INGUINAL HERNIA is a hernia in that part called by ſurgeons bubonocele.

INHARMONICAL RELATION, in muſick, is much the ſame with diſcord.

INHERITANCE, a perpetual right or intereſt in lands, inveſted in a perſon and his heirs.

INHIBITION, a writ to forbid a judge's proceeding in a cauſe that lies before him.

INHUMATION, in chymiſtry, a method of digeſting ſubſtances, by burying the veſſel in which they are contained in horſe-dung or earth. See DIGESTION.

INJECTION, in ſurgery, the forcibly throwing certain liquid medicines into the body by means of a ſyringe, tube, clyſter-pipe, or the like.

Anatomical INJECTION, the filling the veſſels with ſome coloured ſubſtance, in order to make their figures and ramifications viſible.

INITIATED, in antiquity, a term chiefly uſed in ſpeaking of perſons who were admitted to a participation of the ſacred myſteries among the heathens. See MYSTERY.

INJUNCTION, in law, is a writ or kind of prohibition granted in ſeveral caſes; and for the moſt part grounded on an interlocutory order or decree, made in the court of chancery or exchequer for ſtaying proceedings either in courts of law or eccleſiaſtical courts.

INJURY, any wrong done to a man's perſon, reputation, or goods. See ASSAULT, TRESPASS, &c.

INK, *Atramentum*, a black liquor generally made of an infuſion of galls, copperas, and a little gum-arabick.

Compoſition of common Black INK.—"Take one gallon of ſoft water, and pour it boiling hot on one pound of powdered galls, put into a proper veſſel; ſtop the mouth of the veſſel, and ſet it in the ſun in ſummer, or in winter where it may be warmed by any fire; and let it ſtand two or three days. Add then half a pound of green vitriol powdered; and having ſtirred the mixture well together with a wooden ſpatula, let it ſtand again for two or three days, repeating the ſtirring; when add further to it five ounces of gum-arabick diſſolved in a quart of boiling water; and, laſtly, two ounces of alum; after which, the ink ſhould be ſtrained through a coarſe linen cloth for uſe."

Preparation of Red Writing INK.—"Take of the raſpings of Brazil-wood a quarter of a pound; and infuſe them two or three days in vinegar, which ſhould be colourleſs, where it can be ſo procured. Boil the infuſion then an hour over a gentle fire; and afterwards filter it, while hot, through paper, laid in an earthen cullender. Put it again over the fire, and diſſolve in it, firſt half an ounce of gum-arabick; and afterwards of alum and white ſugar, each half an ounce."

Preparation of Red INK *from Vermillion.*—"Take the glair of four eggs, a tea ſpoonful of white ſugar or ſugar-candy beaten to powder, and as much ſpirit of wine; and beat them together till they be of the conſiſtence of oil: then add ſuch a proportion of vermilion as will produce a red colour, ſufficiently ſtrong; and keep the mixture

ture in a ſmall phial or well-ſtopped ink-bottle for uſe. The compoſition ſhould be well ſhaken together before it be uſed."

Inſtead of the glair of eggs, gum-water is frequently uſed: but thin ſize made of iſinglaſs, with a little honey, is much better for the purpoſe.

Sympathetick Ink, a liquor with which a perſon may write, without the letters appearing, till ſome means be taken to render them legible. Of this kind are the glutinous juices of plants, or any other thick and viſcid fluids, provided they have no remarkable colours themſelves; for being written on white paper, nothing will appear, till ſome fine powder of any coloured earth is thrown over the paper, whereby the letters become legible: the reaſon of this is evident, as the powder ſticks only to the letters formed by the inviſible but viſcid liquor.

Another ſort of ſympathetick inks are made of infuſions, the matter of which eaſily burns to a charcoal: thus, if a ſcruple of ſal ammoniack be diſſolved in two ounces of fair water, letters written therewith will be inviſible till held before the fire, for the ſal ammoniack being burnt to a charcoal, by a heat ſtrong enough not to ſcorch the paper, the letters are thereby rendered viſible.

Another ſort of ſympathetick inks are made of a ſolution of lead in vinegar, and a lixivium of lime and orpiment; for if a letter be written with the former, nothing will appear: but to conceal the affair ſtill more, ſome different ſubject may be written above it, with a black ink made of burnt cork and gum-water; then, if a piece of cotton, wetted with the ſaid lixivium, be rubbed over the paper, the ſentence that was viſible will diſappear, and the inviſible one, before written with the ſolution of lead, will be ſeen in its place very black and ſtrong.

Indian Ink is a black pigment brought hither from China, which on being rubbed with water, diſſolves, and forms a ſubſtance reſembling ink; but of a conſiſtence extremely well adapted to the working with a pencil: on which account it is not only much uſed as a black colour in miniature painting, but is the black now generally made uſe of for all ſmaller drawings in chiaro obſcuro, or where the effect is to be produced from light and ſhade only.

Printing Ink is made by boiling or burning linſeed oil till it is pretty thick, adding a little roſin to it, while hot, and then mixing this varniſh with lamp-black.

INLAID-WORK. See Marquetry.

INNATE Ideas, thoſe ſuppoſed to be ſtamped on the mind, from the firſt moment of its exiſtence, and which it conſtantly brings into the world with it: a doctrine which Mr. Locke has abundantly refuted See Idea.

INNOCENT'S Day, a feſtival of the Chriſtian church, obſerved on December 28, in memory of the maſſacre of the innocent children by the command of Herod, king of Judea; who being alarmed at hearing that an infant was born king of the Jews, and imagining that his own kingdom was in danger, ſent peremptory orders to put all the children in Bethlehem, and the adjacent country, to death.

INNOMINATA Ossa, in anatomy, three bones, which together compoſe the trunk of a human body. Theſe, though they form only a ſingle bone in adults, are in infants three perfectly diſtinct bones, each of which has its peculiar name; the upper one is called the ileum; the anterior one, the os pubis, or os pectinis; and the poſterior one, the os pubis, or os iſchium. Theſe are joined by the intervention of a cartillage, as it were, in the middle of that ſingular cavity called the acetabulum, and continue viſibly diſtinct to the age of puberty; after which they coaleſce, and form one entire bone ſo perfectly, that there is not the leaſt veſtige remaining that they ever were ſeparate.

INNUENDO, a word that was frequently uſed in declarations of ſlander, and law pleadings, when theſe were in Latin, in order to aſcertain a perſon or thing before-mentioned; but now, inſtead of the word innuendo, we ſay, meaning ſo and ſo.

INOCULATION, in medicine, the art of tranſplanting a diſtemper from one ſubject to another, by inciſion, particularly uſed for engrafting the ſmall-pox. See Pox.

Inoculation, or Budding, in gardening, a kind of grafting practiſed in the ſummer months on ſeveral kinds of ſtone fruits, as peaches, nectarines, cherries, plumbs, apricots, &c. alſo upon oranges, jaſmines, and various other ſorts of plants. The operation is performed in the following manner:

Provide yourſelf with a good ſharp pen-knife, with a flat haft, adapted to raiſe the bark of the ſtock, to admit the bud; and ſome ſound baſs mat, which ſhould be ſoaked in water, to increaſe its ſtrength, and render it more pliable; then having taken off the cuttings from the trees you would propagate, you muſt chooſe a ſmooth part of the ſtock, about five or ſix inches above the ſurface of the ground, if deſigned for dwarfs; but if for ſtandards, they ſhould be budded ſix feet above ground. Then with your knife make an horizontal cut acroſs the rind of the ſtock, and from the middle of that cut make a ſlit downwards, about two inches in length, ſo that it may be in the form of a T; but you muſt be careful not to cut too deep, leſt you wound the ſtock; then having cut off the leaf from the bud, leaving the foot ſtalk remaining, you ſhould make a croſs cut, about half an inch below the eye, and with your knife ſlit off the bud, with part of the wood to it: this done, you muſt with your knife pull off that part of the wood which was taken with the bud, obſerving whether the eye of the bud be left to it or not; for all thoſe buds which loſe their eyes in ſtripping, are good for nothing: then having gently raiſed the bark of the ſtock with the flat haft of your pen-knife clear to the wood, thruſt the bud therein, obſerving to place it ſmooth between the rind and wood of the ſtock, cutting off any part of the rind belonging to the bud, that may be too long for the ſlit made in the ſtock; and ſo having exactly fitted the bud to the ſtock, tie them cloſely round with baſs mat, beginning at the under part of the ſlit, and ſo proceeding to the top, taking care not to bind round the eye of the bud, which ſhould be left open.

When your buds have been inoculated three weeks or a month, thoſe which are freſh and plump, you may be ſure are joined; and at this time you ſhould looſen the bandage, which, if it be not done in time, will injure if not deſtroy the bud. The March following cut off the ſtock ſloping, about three inches above the bud, and to what is left faſten the ſhoot which proceeds from the bud: but this muſt continue no longer than one year; after which the ſtock muſt be cut off cloſe above the bud. The time for inoculating is from the middle of June to the middle of Auguſt; but the moſt general rule is, when you obſerve the buds formed at the extremity of the ſame year's ſhoot, which is a ſign of their having finiſhed their ſpring growth. The firſt ſort commonly inoculated is the apricot, and the laſt the orange-tree, which ſhould never be done till the latter end of Auguſt: and in doing this work, you ſhould always make choice of cloudy weather; for if it be done in the middle of the day, when the weather is hot, the ſhoots will perſpire ſo faſt, as to leave the buds deſtitute of moiſture.

INORDINATE Proportion is where there are three magnitudes in one rank, and three others proportional to them in another, and you compare them in a different order. Thus, ſuppoſe the numbers in one rank to be 2, 3, 9; and thoſe of the other rank 8, 24, 36; which are compared in a different order, viz. 2 : 3 : : 24 : 36; and 3 : 9 : : 8 : 24. Then rejecting the mean terms of each rank, you conclude 2 : 9 : : 8 : 36.

INQUEST, in law, ſignifies an enquiry made by a jury, in a civil or criminal cauſe, by examining witneſſes. See Jury.

INQUIRENDO, in law, an authority given to one or more perſons, to enquire into ſomething for the advantage of the king.

INQUISITION, in law, a manner of proceeding by way of ſearch or examination uſed on the king's behalf, in caſes of out-lawry, treaſon, felony, ſelf-murder, &c. to diſcover lands, goods, and the like, forfeited to the crown.

Inquisition, in the church of Rome, a tribunal in ſeveral Roman-catholick countries, erected by the popes for the examination and puniſhment of hereticks.

INQUISITORS, in law, perſons who have power by their office to make inquiry into certain caſes; as ſheriffs, and coroners on view of the body.

INROLLMENT, in law, is regiſtering any lawful act, as a ſtatute or recognizance acknowledged, a deed of bargain and ſale, &c. in the rolls of chancery, king's bench, common pleas, or exchequer, at the huſtings of Guildhall, London, or at the quarter-ſeſſions.

INSCONSED, in the military art, part of an army that

that have fortified themſelves with a ſconce or ſmall fort, in order to defend ſome paſs, &c.

INSCRIBED, in geometry. A figure is ſaid to be inſcribed in another, when all its angles touch the ſides or planes of the other figure.

INSCRIPTION, a title or writing carved, engraved, or affixed to any thing, to give a more diſtinct knowledge of it, or to tranſmit ſome important truth to poſterity.

INSECTS, *Inſecta*, in natural hiſtory, a ſmaller ſpecies of animals, commonly exſanguinous.

INSERTION, in anatomy, the inſinuation and cloſe conjunction of the veſſels, fibres, muſcles, or membranes, with ſome other part.

INSERTION, in gardening, denotes the incloſing a graft within the cleft of a tree. See GRAFTING.

INSESSION, *inſeſſio*, *inſeſſus*, *encdre*, *encathiſma*, or *ſemicupium*, in medicine, a kind of half-bath in a proper decoction of herbs, wherein the patient ſits down to the navel. This ſerves to eaſe pain, ſoften the parts, diſpel flatulent matter, and frequently promote the menſes.

INSIPID, or taſteleſs, that which has nothing pungent in it to affect the palate, tongue, &c. and excite the ſenſation of taſting.

INSOLATION, *Inſolatio*, in pharmacy, a method of preparing certain drugs, &c. by expoſing them to the rays of the ſun, either to dry, maturate, or ſharpen them, as is done in vinegar, figs, &c.

INSOLVENT, denotes when a perſon has not wherewithal to pay his juſt debts.

INSPIRATION, *Inſpiratio*, the conveying certain ſupernatural notices to the ſoul. This is ſuch an overpowering impreſſion made of any propoſition upon the mind by God himſelf, as gives an indubitable evidence of the truth and divinity of it.

INSPIRATION, in phyſick, that part of reſpiration, whereby the air is drawn into the lungs, and ſtands contradiſtinguiſhed from exſpiration. This admiſſion of the air depends immediately on its elaſticity, when the cavity of the breaſt is enlarged by the elevation of the thorax and abdomen, and particularly by the motion of the diaphragm downwards. This dilatation of the breaſt does not draw in the air, though it be a condition abſolutely neceſſary to inſpiration, but it is an actual intruſion of the air into the lungs.

INSPISSATING, INSPISSATION, or *Condenſation*, in pharmacy, the reducing a liquor to a thicker conſiſtence by evaporating the thinner parts.

INSTALLMENT, the inſtating a perſon in any dignity. It chiefly denotes the induction of a dean, prebendary, or other eccleſiaſtick dignitary, into the poſſeſſion of his proper ſeat in a cathedral church. This is ſometimes called inſtallation.

INSTALLMENT, likewiſe denotes the ceremony, whereby the knights of the garter are placed in their rank in the chapel of St. George at Windſor.

INSTANT, ſuch a part of duration, wherein we perceive no ſucceſſion, or while one idea paſſes in the mind. The ſchoolmen diſtinguiſh three kinds of inſtants; a temporary, a natural, and a rational inſtant.

Temporary INSTANT, a preciſe part of time immediately antecedent to another, as the laſt inſtant of a day immediately precedes the firſt inſtant of the following.

Natural INSTANT, or a priory of nature, which obtains in things that are ſubordinate in acting, as firſt and ſecond cauſes, cauſes and their effects.

Rational INSTANT, a point which the underſtanding conceives to have been before ſome other inſtant, and this with regard to the determinations of God Almighty, but, as there was no real inſtant when God had not formed any determination, this inſtant is called a rational inſtant, by way of oppoſition to an inſtant of time.

INSTAURATION, the re-eſtabliſhing a church, or the like, in its former ſtate.

INSTINCT, *Inſtinctus*, a natural ſagacity with which animals are endued, being in them ſomething analogous to what reaſon is in mankind. By virtue of this inſtinct they know what is beneficial for them, defend themſelves, and propagate their ſpecies.

INSTITUTES, *Inſtituta*, in the civil law, a book containing the principles of the Roman law, being the laſt part of the corpus juris civilis. They are a ſummary of the whole body of the civil law, compoſed by Trebonianus, Theophilus, and Dorotheus, by order of the emperor Juſtinian, for the uſe of young ſtudents.

INSTITUTES, likewiſe denote a ſyſtem of rules in any ſcience.

INSTITUTION, in general, the act of ordaining or eſtabliſhing any thing.

INSTITUTION, in law, the act of a biſhop, or one commiſſioned by him, whereby a clerk is inveſted with the ſpiritualities of a rectory or vicarage.

INSTITUTIONS, a ſyſtem of the elements or rules of any art or ſcience.

INSTRUMENT, that which is ſubſervient to a cauſe for producing any effect.

INSTRUMENT, in law, implies ſome publick act, or authentick deed, by which any truth is made apparent, or any right or title eſtabliſhed in a court of juſtice.

INSULATED, *Inſulatus*, in architecture, an appellation given to ſuch columns as ſtand alone, or free from any contiguous wall, &c. like an iſland in the ſea; whence the name.

INSULT, *Inſultus*, in medicine, ſignifies the acceſs of the paroxyſm of intermitting diſeaſes. See INTERMITTENT and PAROXYSM.

INSULT, in the art of war, the ſame with aſſault. See ASSAULT.

INSUPER, over and above, a term uſed by the auditors of the exchequer in their accounts; thus, where a certain ſum is charged to a perſon's account, they ſay, ſo much remains, inſuper, to the accountant.

INSURANCE, or ASSURANCE, in law and commerce, a contract or agreement whereby one or more perſons, called inſurers, aſſurers, &c. oblige themſelves to anſwer for the loſs of a ſhip, houſe, goods, &c. in conſideration of a premium paid by the proprietors of the things inſured.

Inſurances are of various kinds, as on ſhips or parts of ſhips, on merchandize ſingly, and on ſhips and goods jointly: and theſe are again branched out to run either for a time ſtipulated, or to one ſingle port, or out and home, with liberty to touch at the different places mentioned in the policy. Inſurances may likewiſe be made on goods ſent by land, or by hoys, &c. on rivers; and this is frequently done, more eſpecially on jewels, and other things of great value. They may likewiſe be made on ſhips and goods, loſt or not loſt, which is commonly done when a ſhip has been long miſſing; and thoſe words being inſerted in the policy, oblige the underwriters to pay, though the ſhip was loſt at the time of making ſuch inſurance, except the aſſured had then certain knowledge of the ſhip's being wrecked; in which caſe the ſubſcription ſhall not oblige, as this is accounted a mere fraud.

INTACTÆ, in conicks, an appellation ſometimes given to the aſymptotes. See ASYMPTOTE.

INTAGLIOS, precious ſtones on which are engraved the heads of great men, inſcriptions, and the like; ſuch as we frequently ſee ſet in rings, ſeals, &c.

INTAKERS, a ſort of robbers in the north of England, who formerly received the booty which their confederates the out-partners, brought from the borders of Scotland.

INTEGER, in arithmetick, a whole number in contradiſtinction to a fraction.

INTEGRAL, or INTEGRANT, in philoſophy, appellations given to parts of bodies which are of a ſimilar ſtature with the whole: thus filings of iron have the ſame nature and properties as bars of iron. Bodies may be reduced into their integrant parts by triture or grinding, limation or filing, ſolution, amalgamation, &c.

INTENDMENT, in law, is the intention, deſign, or true meaning of a perſon or thing, which frequently ſupplies what is not fully expreſſed: but though the intent of parties in deeds and contracts is much regarded by the law, yet it cannot take place againſt the rules of law.

INTENDMENT *of Crimes*; this, in caſe of treaſon, where the intention is proved by circumſtances, is puniſhable in the ſame manner as if it was put in execution. So if a perſon enters a houſe in the night-time, with an intent to commit burglary, it is felony: alſo an aſſault, with an intent to commit a robbery on the highway, is made felony, and puniſhed with tranſportation.

INTERCALARY, *Intercalaris*, in chronology, an appellation given to the odd day inſerted in leap-year; which

which was ſo called from calo, calare, to proclaim, it being proclaimed by the prieſts with a loud voice.

INTERCEPTED AXIS, in conick ſections, the ſame with abſciſſe. See ABSCISSE.

INTERCESSION, in Roman antiquity, the act of a tribune of the people, or other magiſtrate, whereby he inhibited the act of another magiſtrate. The tribunes had an unlimited power to interceed or controul the acts of every other magiſtrate, who could only inhibit the acts of inferior magiſtrates.

INTERCOLUMNIATION, in architecture, denotes the ſpace between two columns, which is always to be proportioned to the height and bulk of the columns. Some authors have laid down the following proportions for the intercolumniations, at a medium, viz. in the Tuſcan order, it muſt be equal to four diameters of the column below; in the Dorick, to three; in the Ionick, to two; in the Corinthian, to two and a quarter; and in the Compoſite, to one and an half.

INTERCOSTAL, in anatomy, any thing between the coſtæ or ribs; as the muſcles, nerves, &c.

INTERDICT, an eccleſiaſtical cenſure, by which the church of Rome forbids the performance of divine ſervice in a kingdom, province, town, &c. This cenſure has been frequently executed in France, Italy and Germany; and in the year 1170, pope Alexander III. put all England under an interdict, forbidding the clergy to perform any part of divine ſervice, except baptizing of infants, taking confeſſions, and giving abſolution to dying penitents. But this cenſure being liable to the ill conſequences of promoting libertiniſm and a neglect of religion, the ſucceeding popes have very ſeldom made uſe of it. There was alſo an interdict of perſons, who were deprived of the benefit of attending on divine ſervice.

INTERDICTS, in the Roman law, certain formulæ of words, by which the prætor, when the poſſeſſion of any thing was conteſted, forbad or ordered ſomething to be done with it, till the property ſhould be legally determined. Of this there were three kinds, prohibitory, reſtitutory, and exhibitory.

Prohibitory INTERDICTS, by which the judges forbad any one vexing another in the poſſeſſion of what legally belonged to him.

Reſtitutory INTERDICTS, by which the judges appointed any one, who had been driven out of his eſtate, to be reinſtated, before his right was legally aſcertained; and this was the ſame with reintegrant.

Exhibitory INTERDICTS, by which any thing in diſpute was ordered to be exhibited, as a teſtament, &c.

INTERDICTION *of Fire and Water*, in antiquity, a ſentence pronounced againſt ſuch as were for ſome crime to be baniſhed. By thus giving order that no body ſhould receive them, but deny them fire and water, they were condemned to a civil death, and this was called legitimum exilium.

INTEREST, a ſum of money which is reckoned for the loan and forbearance of ſome other ſum lent for, or due at, a certain time, according to a certain rate in the hundred pounds. The ſum lent or forborne is called the principal, becauſe it produces the intereſt, or from which the intereſt is reckoned. Intereſt is either ſimple or compound.

Simple INTEREST, is that which is paid for the loan of any principal or ſum of money lent out for ſome time at any rate per cent. agreed on between the borrower and the lender; which, according to the laws of England, ought to be 6l. for the uſe of 100l. for one year, and 12l. for the uſe of 100l. for 2 years. And ſo on for a greater or leſs ſum proportionable to the time propoſed.

There are ſeveral ways of computing, or anſwering queſtions about ſimple intereſt as by the ſingle and double rule of three; others make uſe of tables compoſed of ſeveral rates per cent.

But we ſhall ſhew that all computations, relating to ſimple intereſt, are grounded upon arithmetical progreſſion; and from thence raiſe ſuch general theorems, as will ſuit with all caſes. In order to that,

$$\text{Let}\begin{cases} P = \text{any principal or ſum put to intereſt.} \\ K = \text{the ratio of the rate per cent. per annum.} \\ t = \text{the time of the principal's continuing at intereſt.} \\ A = \text{the amount of the principal and its intereſt.} \end{cases}$$

Note. The ratio of the rate is only the ſimple intereſt of 1l. for one year, at any given rate; and it is thus found:

Viz. $100 : 6 :: 1 : 0{,}06 =$ the ratio at 6 per cent. per annum.

Or $100 : 7 :: 1 : 0{,}07 =$ the ratio at 7 per cent. &c.

Again $100 : 7{,}5 :: 1 : 0{,}075 =$ the ratio at 7 and ½ per cent.

And, if the given time be whole years, then $t =$ the number of thoſe years: but if the time given be either pure parts of a year, or parts of a year mixed with years, thoſe parts muſt be turned into decimals, and then $t =$ thoſe decimals, &c. Now the common parts of a year may be eaſily turned or converted into decimal parts, if it be conſidered,

$$\text{That one}\begin{cases} \text{Day is the } \tfrac{1}{365} \text{ part of a year} = 0{,}00274. \\ \text{Month is the } \tfrac{1}{12} \text{ part of a year} = 0{,}0833333. \\ \text{Quarter is the } \tfrac{1}{4}\text{th of a year} = 0{,}25. \end{cases}$$

Half a year $= 0{,}5$ and three quarters $= 0{,}75$.

Theſe things being premiſed, we may proceed to raiſing the theorems:

Let $R =$ the intereſt of 1l. for one year as before.
Then $2\,R =$ the intereſt of 1l. for 2 years.
And $3\,R =$ the intereſt of 1l. for 3 years.
$4\,R =$ the intereſt of 1l. for 4 years, and ſo on for any number of years propoſed.

Hence it is plain that the ſimple intereſt of 1l. is a ſeries of terms in arithmetical progreſſion increaſing, whoſe firſt term and common difference is R. And the number of all the terms is t. Therefore the laſt term will always be $tR =$ the intereſt of 1l. for any given time ſignified by t.

Then As 1l. is to the intereſt of 1l. ſo is any principal or given ſum to its intereſt.

That is, $1\text{l} : tR :: P : tRP =$ the intereſt of P. Then, the principal being added to its intereſt, their ſum will be $= A$ the amount required: which gives this general theorem,

Theorem $tRP + P = A$.

From whence the three following theorems are eaſily deduced:

$$\text{Theorem 2.}\left\{\frac{A}{tR+1} = P.\right.$$

$$\text{Theorem 3.}\left\{\frac{A-P}{tP} = R.\right.$$

$$\text{Theorem 4.}\left\{\frac{A-P}{RP} = t.\right.$$

Theſe four theorems reſolve all queſtions about ſimple intereſt. Thus if it were to be required to find what 256l. 10s. will amount to in 3 years, 1 quarter, 2 months, and 18 days, at 6 per cent. per annum:

Here is given $P = 256{,}5$. $R = 0{,}06$. And $t = 3{,}46599$
For 3 years $= 3$, Quere A, per theorem 1.
One quarter $= 0{,}25$
2 months $= 0{,}16667 = 0{,}08333 \times 2$.
18 days $= 0{,}04932 = 0{,}00274 \times 18$.
Hence $t = 3{,}46599. \times 0{,}06 = 0{,}2079594 = tR$.
Then $0{,}2079594 \times 256{,}5 = 53{,}341586 = tRP$.
And $53{,}341586 + 256{,}5 = 309{,}841586 = tRP + P = A$
That is, $309{,}841586 =$ 309l. 16s. 10d. being the anſwer required.

And thus may all queſtions, relating to ſimple intereſt, be reſolved, due regard being had to the theorem relating to the queſtion.

Compound INTEREST, is that which ariſes from any principal and its intereſt put together, as the intereſt ſtill becomes due; ſo that at every payment, or at the time when the payments become due, there is created a new principal; and for that reaſon it is called intereſt upon intereſt, or compound intereſt.

As for inſtance ſuppoſe 100l. were lent out for two years at 6 per cent per annum compound intereſt, then at the end of the firſt year it will only amount to 106l. as in ſimple intereſt. But for the ſecond year this 106l. becomes principal, which will amount to 112l. 7s. 2d. ½, at the ſecond year's end, whereas by ſimple intereſt it would have amounted to but 112l. And although it is not lawful to let out money at compound intereſt, yet in purchaſing annuities or penſions, &c. and taking leaſes in reverſion, it is very uſual to allow compound intereſt to the purchaſer for his ready money, and therefore it is very requiſite to underſtand it.

Let
P = the principal put to intereſt.
t = the time of its continuance.
A = the amount of the principal and intereſt.
R = the amount of 1l. and its intereſt for 1 year at any given rate, which may be thus found :

Viz. 100 : 106 :: 1 : 1,06 = the amount of 1l. at 6 per cent.

Or, 100 : 107 :: 1 : 1,07 = the amount of 1l. at 7 per cent.

And ſo on for any aſſigned rate of intereſt.

Then if R = the amount of 1l. for 1 year at any rule.
R R = the amount of 1l. for 2 years.
R R R = the amount of 1l. for 3 years.
R^4 = the amount of 1l. for 4 years.
R^5 = the amount of 1l. for 5 years. Here $t = 5$.

For 1 : R :: R : R R :: R R : R R R :: R R R : R^4 :: R^4 : R^5 &c. in ÷

That is, as one pound, is to the amount of one pound at one year's end; ſo is that amount, to the amount of one pound at two years end.

Whence it is plain that compound intereſt is grounded upon a ſeries of terms increaſing in geometrical proportion continued; wherein t (viz. the number of years) does always aſſign the index of the laſt and higheſt term, viz. the power of R, which is R.

Again, as 1 : R^t :: P : P R^t = A the amount of P for the time that R^t = the amount of 1l.

That is, as 1l. is to the amount of 1l. for any given time; ſo is any propoſed principle (or ſum) to its amount for the ſame time.

From the premiſes, we preſume, the reaſon of the following theorems may be very eaſily underſtood :

Theorem 1. $PR^t = A$, as above.

From hence the two following theorems are eaſily deduced :

Theorem 2. $\left\{\frac{A}{R^t} = P.\right.$

Theorem 3. $\left\{\frac{A}{P} = R^t.\right.$

By theſe three theorems all queſtions about compound intereſt, may be truly reſolved by the pen only, viz. without tables; though not ſo readily as by the help of tables, calculated on purpoſe.

Annuities, or Penſions in Arrear, computed at Compound Interest.

Suppoſe u = the firſt year's rent of any annuity without intereſt. Then will R $u+u$ = the amount of the firſt year's rent and intereſt; more the ſecond year's rent.

And R R u + R $u+u$ = the amount of the firſt and ſecond years rents, with their intereſt; more the third year's rent, &c.

Here R R u + R $u+u$ = A the amount of any yearly rent or annuity, being forborne three years. And from hence may be deduced theſe proportions :

Viz. u : R u :: R u : R R u :: R R u : R R R u, and ſo on in ÷ for any number of terms or years denoted by t, wherein the laſt term will always be $u\,R^{t-1}$.

Conſequently $A - u\,R^{t-1}$ = the ſum of all the antecedents.

And $A - u$ = the ſum of all the conſequents in the ſeries.

And therefore it will be $u : u\,R :: A - u\,R^{t-1} : A - u$.

Ergo $A\,u - u\,u = R\,u\,A - u\,u\,R^t$, which, being divided all by u, will become $A - u = R\,A - u\,R^t$.

From this laſt equation it will be eaſy to raiſe the following theorems.

Theorem 1. $\left\{\frac{u\,R^t - u}{R-1} = A.\right.$

Theorem 2. $\left\{\frac{R\,A - A}{R^t - 1} = u.\right.$

Theorem 3. $\left\{\frac{R\,A + u - A}{u} = R^t.\right.$ If this equation be continually divided by R until nothing remains, the number of theſe diviſions will be t.

Again $\left\{\frac{A}{u}R - R^t = \frac{A-u}{u}\right.$ If this equation be reſolved into numbers, by a converging ſeries, the root will ſhew the value of R.

By theſe theorems all queſtions relating to annuities, computed at compound intereſt, may be ſolved.

Several ingenious mathematicians, as Dr. Halley, De Moivre, Sympſon, &c. have explained the method of computing the expectation, or eſtimate of life; but it will be ſufficient for our purpoſe to mention that deduced by the great Dr. Halley from the monthly tables of the births and funerals in Breſlaw, the capital city of the province of Sileſia; or, as the Germans call it, Schleſia. Whence he proves, that it is 80 to 1 a perſon of 25 years old will not die in a year: that it is 5 ½ to 1, that a man of 40 will live 7 years: that a man of 30 years old may reaſonably expect to live 27 or 28 years, &c. See *Philoſ. Tranſ.* No. 196.

Now, from theſe and the like proportions, he juſtly infers, that the price of inſurance upon lives ought to be regulated: there being a great difference between the life of a man of 20 and one of 50. For example, it is a 100 to 1 that a man of 20 dies not in a year, and but 38 to 1, for a man of 50 years of age. And upon theſe alſo depends the valuation of annuities for lives. For it is plain that the purchaſer ought to pay only ſuch a part of the value of any annuity, as he hath chances that he is living.

Interest, in law, is generally taken for a chattel real, or a leaſe for years, &c. but more for a future term.

INTERJECTION, in grammar, an indeclinable part of ſpeech, ſignifying ſome paſſion or emotion of the mind. As the greateſt part of the expreſſions uſed on theſe occaſions are taken from nature alone, the real interjections in moſt languages, are monoſyllables; and as all nations agree in theſe natural paſſions, ſo do they agree in the ſigns and indications of them, as of love, mirth, &c. The Greeks confound their interjections with adverbs, and the Hebrews confound them with their adverbs and prepoſitions, calling them all by the general name particle.

INTERIM, a name given to a formulary, or kind of confeſſion to the articles of faith, obtruded upon the proteſtants after Luther's death by the emperor Charles V. when he had defeated their forces; ſo called becauſe it was only to take place in the interim, or mean time, till a general council ſhould have decided all points in diſpute between the proteſtants and the Romaniſts.

INTERLOCUTORY Order, in law, an order that does not decide the cauſe, but only ſome matter incident thereto, which happens between the beginning and end of a cauſe; as when in chancery or exchequer, the plaintiff obtains an order for an injunction until the hearing of the cauſe; which order, not being final, is called interlocutory.

INTERLUDE, an entertainment exhibited on the theatre between the acts of the play, to amuſe the ſpectators while the actors ſhift their dreſs; or to give time of changing the ſcenes and decorations.

INTERMITTENT, or Intermitting Fevers, ſuch fevers as go off and ſoon return again, in oppoſition to thoſe which are continual. See Fever.

INTERNAL, in general, denotes whatever is within a thing.

INTERNODIUM, among botaniſts, implies the ſpace between two knots or joints of the ſtalks of barley, oats, and the like plants.

INTEROSSEUS, in anatomy, an appellation given to the muſcles which move the fingers and toes, from their being ſituated between the bones of thoſe parts. See Muscle, Flexor, &c.

INTERPRETATION, among criticks, denotes a ſpurious paſſage, inſerted into the writings of ſome ancient author.

INTERPRETER, in general, denotes a perſon who explains the words or writings of another, ſo as to make them intelligible to thoſe who did not underſtand them before.

INTERREGNUM, the time during which the throne is vacant, in elective kingdoms; for in ſuch as are here hereditary, like ours, there is no ſuch thing as an interregnum.

INTERREX, the magiſtrate who governs during an interregnum.

INTERROGATION, or *Point of* Interrogation, in grammar, a character of this form (?) ſerving to denote a queſtion.

Interrogation, in rhetorick, is a figure whereby the orator propoſes ſomething by way of queſtion; which, it muſt be owned, greatly enlivens the diſcourſe.

INTERROGATORIES, in law, are queſtions

wrote down, and demanded of the witneſſes examined in a cauſe, more eſpecially in a court of chancery.

INTERRUPTION denotes the ſame thing with disjunction in proportion, and is noted thus (::) ſignifying the breaking of the ratio in the middle of four diſcrete proportionals; as A : B :: C : D; that is, as A to B, ſo is C to D.

INTERRUPTION, in rhetorick, when a perſon breaks off his diſcourſe ſuddenly to ſhew ſome paſſion.

INTERSECTION, in mathematicks, the cutting of a line or plane by another, or the point or line wherein two lines or two planes cut each other. The word is derived from the Latin *inter*, and *ſeco*, to cut. The mutual interſection of two planes in a right line. The centre of a circle is in the interſection of two diameters, &c. The equinoxes happen, when the ſun is in the interſections of the equator and ecliptick.

INTERSPINALES *Colli*, in anatomy, ſmall fleſhy muſcles of the neck, ariſing from the ſuperior parts of each double ſpinal proceſs of the neck, except of the ſecond vertebræ; and inſerted into the inferior parts of all the double ſpines. When theſe muſcles act, they draw the ſpines of the vertebra of the neck nearer each other.

INTERSTELLAR, a word uſed by ſome authors to expreſs thoſe parts of the univerſe that are without and beyond our ſolar ſyſtem.

INTERTIES, in architecture, thoſe ſmall pieces of timber that lie horizontally between the ſommers, or between them and the ſell, or reſon.

INTERTRANSVERSALES *Colli*, in anatomy, certain muſcles ſituated among the tranſverſe apophyſes of the vertebræ: they ariſe from the lower vertebra, and are inſerted into that next above: they are of the ſame ſize and figure with the interſpinales.

INTERVAL, in muſick, the difference between two ſounds, in reſpect of acute and grave; or, that imaginary ſpace terminated by two ſounds, differing in acuteneſs or gravity.

INTERVALS, in gardening and huſbandry, the ſpaces left between the ſeveral rows of plants ſown or ſet in gardens or fields.

INTESTATE, in law, a perſon that dies without making a will; in which caſe, a diſtribution of his perſonal eſtate, after his debts and funeral charges are paid, is to be made among the wife and children of the deceaſed, or for want of ſuch, among the next of kin.

INTESTINES, in anatomy, long, cylindrical, hollow, and membranaceous bodies; or rather, one ſuch continued body or tube, reaching from the ſtomach to the anus. The ſtructure and ſubſtance of the inteſtines are membranaceous; being formed, in every part, of five coats or tunicks. The firſt is the common coat, from the peritonæum, and is membranaceous. The ſecond is cellular, and is called by late writers, tunica celluloſa Ruyſchii: it is contiguous with the meſentery, and is to be diſcovered by inflating it; this coat, in fat animals, frequently contains abundance of fat. The third is muſcular; it is compoſed of a double ſeries of fibres, in part longitudinal, and in part annular; and theſe aſſiſt the motion of the guts. The fourth coat is nervous: it is furniſhed with abundance of cellules, vaſcules, and glands, and is thicker than the others: from this ariſe the rugæ, and the valves of the inteſtines. The fifth is the villoſe coat, which ſuſtains the terminations of the excretory veſſels, and the beginnings of the lacteals: hence, when nicely examined, it has the appearance of a ſieve: it is the organ of percolation of the chyle.

The inteſtines have veſſels in great abundance. Their arteries are from the meſeraick ones: the upper meſeraick ſerving for the ſmaller inteſtines, the lower for the larger; and theſe make a multitude of very ſingular and ſurpriſing anaſtomoſes. The veins are meſeraicks, and go off to the vena portæ and the liver. The nerves are ſent from the intercoſtals, and the par vagum. And beſides theſe, we are to obſerve the lacteal veſſels. See LACTEALS.

The rectum, it is to be obſerved, receives blood-veſſels alſo from the hypogaſtricks. There are alſo, beſides the Brunnerian glands of the duodenum, other glands in the inteſtines, called from the name of the perſon who diſcovered them, glandulæ Peyeri. Theſe, in the ſmall guts, are uſually little, congregate, and miliary; but ſometimes they are ſingle. They are larger as they are nearer to the duodenum, and ſmaller as they approach towards the great guts. Their office is to diſcharge into the inteſtines a liquor, which ſerves for the attenuation of the chyle, and for the lubricating of the inteſtines. In the larger guts, and in the vermiform appendage, they are ſingle and large, of a lenticular figure; and they are largeſt of all in the rectum. They have mouths, out of which there is ſecreted a fluid, which ſerves to lubricate the ſides of the inteſtines, and to ſoften the fæces, that they may be evacuated without pain.

The uſe of the ſmaller guts is to promote the formation of the chyle, to perfect its ſecretions, and to propel the remaining fæces to the larger. The office of the larger guts is to receive and collect the matter of the fæces, at a proper time to expel it. See CHYLE.

INTESTINAL, ſomething belonging to, or ſeated in the inteſtines.

INTRADA, ENTRY, in the Italian muſick, is much the ſame with prelude or overture.

INTRENCHMENT, or RETRENCHMENT, in the art of war. See RETRENCHMENT.

INTRIGUE, or INTREAGUE, an aſſemblage of events or circumſtances, occurring in an affair, and perplexing the perſons concerned in it.

In this ſenſe, it is uſed to ſignify the nodus or plot of a play or romance; or that point wherein the principal characters are moſt embarraſſed, through the artifice and oppoſition of certain perſons, or the unfortunate falling out of certain accidents and circumſtances.

In tragedy, or an epick poem, there are always two deſigns; the firſt and principal is that of the hero of the piece: the ſecond contains the deſigns of all thoſe who oppoſe him: theſe oppoſite cauſes produce oppoſite effects; to wit, the efforts of the hero for the execution of his deſign, and the efforts of thoſe who thwart it. As thoſe cauſes and deſigns are the beginning of the action, ſo theſe efforts are the middle, and there form a knot or difficulty which we call the intrigue, that makes the greateſt part of the poem. It laſts as long as the mind of the reader or hearer is ſuſpended about the event of thoſe oppoſite efforts: the ſolution or cataſtrophe commences when the knot begins to unravel, and the difficulties and doubts begin to clear up.

INTRINSICK, a term applied to the inner, real, and genuine values, properties, &c. of any thing, in oppoſition to their extrinſick or apparent values, &c.

INTRUSION, in law, obtains where an anceſtor dies ſeiſed of an eſtate or inheritance, which is expectant upon an eſtate for life, and the tenant for life dies; after which a ſtranger enters before the heir, in which caſe he is ſaid to intrude.

INTUITION, among logicians, the act whereby the mind perceives the agreement or diſagreement of two ideas, immediately by themſelves, without the intervention of any other; in which caſe, the mind perceives the truth as the eye doth the light, only by being directed towards it.

INVALID, a perſon wounded, maimed, or diſabled for action by age, &c.

INVECTED, in heraldry, denotes a thing fluted or furrowed.

INVECTIVE, in rhetorick, differs from reproof, as the latter proceeds from a friend, and is intended for the good of the perſon reproved; whereas the invective is the work of an enemy, and entirely deſigned to vex and give uneaſineſs to the perſon againſt whom it is directed.

INVENTION denotes the act of finding any thing new, or even the thing thus found.

INVENTION, in rhetorick, being one of the ſecond diviſions of invention, according to Bacon, ſignifies the finding out and chooſing of arguments, which the orator is to uſe for proving his point, or moving his hearers paſſions.

INVENTION, in poetry, is applied to whatever the poet adds to the hiſtory of the ſubject he has choſen, as well as to the new turn he gives it.

INVENTION, in painting, is the choice which the painter makes of the objects that are to enter the compoſition of his piece.

INVENTORY, in law, a catalogue orderly made, of all the goods and chattels, of a perſon deceaſed, appraiſed by four or more credible men, which every executor or adminiſtrator is obliged to exhibit to the ordinary at ſuch time as he ſhall appoint.

Inventory, in trade, a particular liſt or valuation of goods, &c.

INVERSE, a manner of working the rule of three or proportion, which is contrary to the order of the common and direct rule. In the rule of three direct, the firſt term is to the ſecond, as the third is to the fourth; that is, if the ſecond be greater than the third, or leſs than the firſt, in any proportion, the fourth is leſs than the third in the ſame proportion. But in the inverſe rule, the fourth term is as much greater than the third, as the ſecond is leſs than the firſt.

INVERSION, the inverting or turning any thing backwards.

Inversion, in grammar, the arranging the words of any phraſe, otherwiſe than in the natural order. It is a conſiderable beauty either in verſe or proſe. It gives vigour and variety to a ſentence, and keeps the mind in an agreeable ſuſpence and expectation of a marvellous turn.

INVESTIGATION, properly denotes the finding any thing out by the prints of the feet.

Mathematicians, &c. have hence applied the word to the reſpective reſearches in which they are employed.

Investigation of a theme, in grammar, the finding out the primitive tenſe, mood, and perſon of any verb that is remote from its ſource.

It is abſolutely neceſſary to be acquainted with this method of inveſtigation, in order to underſtand a Greek author. Clenard was the firſt who introduced the term into grammar.

INVESTING, the conferring on any one the property of a fee, dignity, or office; or ratifying what has been obtained elſewhere.

The emperor of Germany pretends to a right of inveſting ſeveral princes and ſtates both in the Empire and in Italy.

Investing, in the art of war, the opening a ſiege, and encamping of an army round a place, to block up its avenues, and prevent all ingreſs and egreſs. The cavalry always begins to inveſt a place.

Investing, in law, the putting a perſon in poſſeſſion, or giving him livery of ſeiſin.

INVESTITURE, denotes both the right and the act of inveſting a vaſſal. Inveſtiture is either proper or improper: proper or true inveſtiture is when the thing itſelf is delivered to the party, as when a perſon is put into the poſſeſſion of land, by delivering him a turf or lump of earth: improper, when the ſame is conferred by delivering a ſword, ſpear, banner, wand, ring, arrow, &c.

INVOCATION, the act by which we adore God, and implore his aſſiſtance. The word is Latin, *Invocatio*, and derived from *in*, and *voco*, to call.

The Romaniſts implore the aid of ſaints to intercede with God for them. This is one of the grand articles of diſpute between the Roman catholicks and the reformed. The practice began in the fifth age in the eaſtern church, but nothing, as far as appears, like what is now practiſed in the church of Rome, there having been no canonizations, proceſſions, maſſes, litanies, prayers, and oblations to ſaints at that time.

Invocation, in poetry, an addreſs at the beginning of a poem, wherein the poet calls for the aſſiſtance of ſome divinity, particularly of his muſe, the god of poetry, or that which preſides over the particular ſubject treated of.

INVOICE, or Invoyce, in trade, an account of commodities, their value, cuſtoms, proviſion, charges, &c. ſent by a merchant to his factor, or correſpondent, in any other country.

Book of Invoice, in book-keeping, a book to ſave the journal from the eraſures inevitable in taking accounts or invoices of the ſeveral goods received, ſent, or ſold: where it is neceſſary to be very particular, and to render thoſe invoices eaſier to find than they can be in the waſte-book. The invoices, here entered, are to be thoſe of goods bought, and ſet to account of ſome other; thoſe of goods ſold by commiſſion; of goods ſent away to be ſold on our account, and thoſe of goods ſold in partnerſhip, whereof we or others have the direction. After the date the narration is to begin thus: Shipped aboard the ſhip—A B maſter, bound for—the following goods, conſigned to—for my account, or by order, and the account of—Or, it may begin thus:—Invoice of goods ſhipped aboard,—&c.

INVOLUTION, in algebra, the raiſing any quantity from its root to any height or power aſſigned.

The quantity a^m expreſſes any power of a in general; the exponent (m) being undetermined; and a^{-m} expreſſes $\frac{1}{a^m}$, or a negative power of a of an equal exponent: and $a^m \times a^{-m} = a^{m-m} = a^0 = 1$ is their product. a^n expreſſes any other power of a; $a^m \times a^n = a^{m+n}$ is the product of the powers a^m and a^n, and a^{m-n} is their quotient.

To raiſe any ſimple quantity to its 2d, 3d, or 4th power, is to add its exponent twice or four times to itſelf; therefore, the 2d power of any quantity is had by doubling its exponent, and the 3d by trebling its exponent; and in general the power expreſſed by m of any quantity is had by multiplying the exponent by m, as is obvious from the multiplication of powers. Thus, the 2d power or ſquare of a is $a^{2 \times 1} = a^2$; its third power or cube is $a^{3 \times 1} = a^3$; and the m^{th} power of a is $a^{m \times 1} = a^m$. Alſo, the ſquare of a^4 is $a^{2 \times 4} = a^8$; the cube of a^4 is $a^{3 \times 4} = a^{12}$; and the m^{th} power of a^4 is $a^{4 \times m}$. The ſquare of abc is $a^2 b^2 c^2$, the cube is $a^3 b^3 c^3$, the m^{th} power $a^m b^m c^m$.

The co-efficient muſt alſo be raiſed to the ſame power by a continual multiplication of itſelf, as often as an unit by itſelf, is contained in the exponent of the power required. Thus the cube of $3ab$ is $3 \times 3 \times 3 \times a^3 b^3 = 27 a^3 b^3$.

As to the ſigns when the quantity to be involved is poſitive, it is obvious that all its powers muſt be poſitive. And, when the quantity to be involved is negative, yet all its powers whoſe exponents are even numbers muſt be poſitive; for any number of multiplications of a negative, if the number is even, gives a poſitive.

The power then only can be negative, when its exponent is an odd number, though the quantity to be involved be negative. The powers of $-a$ are $-a, +a^2, -a^3, +a^4, -a^5$, &c. Thoſe whoſe exponents are 2, 4, 6, &c. are poſitive; but thoſe whoſe exponents are 1, 3, 5, &c. are negative.

The involution of compound quantities is a more difficult operation. The powers of any binomial $a+b$ are found by a continual multiplication of it by itſelf, as follows:

$$\begin{array}{ll}
 & a + b = \text{the root.} \\
\times & a + b \\ \hline
 & a^2 + ab \\
 & \quad + ab + b^2 \\ \hline
 & a^2 + 2ab + b^2 = \text{the ſquare or 2d power.} \\
\times & a + b \\ \hline
 & a^3 + 2a^2 b + ab^2 \\
 & \quad + a^2 b + 2ab^2 + b^3 \\ \hline
 & a^3 + 3a^2 b + 3ab^2 + b^3 = \text{the curbe or 3d power.} \\
\times & a + b \\ \hline
 & a^4 + 3a^3 b + 3a^2 b^2 + ab^3 \\
 & \quad + a^3 b + 3a^2 b^2 + ab^3 + b^4 \\ \hline
 & a^4 + 4a^3 b + 6a^2 b^2 + 4ab^3 + b^4 = \text{the biquadrate or 4th power.}
\end{array}$$

If the powers of $a-b$ are required, they will be found the ſame as the preceding, only the terms in which the exponent of b is an odd number will be found negative; becauſe an odd number of multiplications of a negative produces a negative. Thus the cube of $a-b$ will be found to be $a^3 - 3a^2 b + 3ab^2 - b^3$: where the 2d and 4th terms are negative, the exponent of b being an odd number in theſe terms. In general, the terms of any power of $a-b$ are poſitive and negative by turns.

If it be obſerved, that, in the firſt term of any power of $a+b$, the quantity a has the exponent of the power required; that, in the following terms, the exponents of a decreaſe gradually by the ſame difference (viz. an unit) and that in the laſt terms it is never found: the powers of b are in the contrary order; it is not found in the firſt term, but its exponent in the 2d term is an unit, in the 3d term its exponent is 2; and thus its exponent increaſes, till in the laſt term, it becomes equal to the exponent of the power required.

As the exponents of a thus decreaſe, and at the ſame time thoſe of b increaſe, the ſum of their exponents is always the ſame, and is equal to the exponent of the power required.

To find the co-efficient of any term, the co-efficient

of the preceding term being known, you are to divide the co-efficient of the preceding term by the exponent of b in the given term, and to multiply the quotient by the exponent of a in the ſame term, increaſed by an unit.

In general, if $a+b$ is to be raiſed to any power m, the terms, without their co-efficients, will be a^m, $a^{m-1}b$, $a^{m-2}b^2$, $a^{m-3}b^3$, $a^{m-4}b^4$, $a^{m-5}b^5$, &c. continued till the exponent of b becomes equal to m.

The co-efficients of the reſpective terms, according to the laſt rules, will be 1, m, $m\times\frac{m-1}{2}$, $m\times\frac{m-1}{2}\times\frac{m-2}{3}$, $m\times\frac{m-1}{2}\times\frac{m-2}{3}\times\frac{m-3}{4}$, $m\times\frac{m-1}{2}\times\frac{m-2}{3}\times\frac{m-3}{4}\times\frac{m-4}{5}$, &c. continued until you have one co-efficient more than there are units in m.

JOACHIMITES, in church hiſtory, the diſciples of Joachim, a Ciſtertian monk, who was an abbot of Flora in Calabria, and a great pretender to inſpiration.

JOB, or *Book of* JOB, a canonical book of the Old Teſtament, containing a narrative of a ſeries of afflictions which befell a man whoſe name was Job. This book is filled with thoſe noble, bold and figurative expreſſions, which conſtitute the very ſoul of poetry.

JOHN, or the *Goſpel of St.* JOHN, a canonical book of the New Teſtament, containing a recital of the life, actions, doctrines and death of our Saviour, written at the deſire of the Chriſtians of Aſia, by St. John the Apoſtle and Evangeliſt.

St. Jerom ſays, St. John would not undertake it, but on condition they ſhould appoint a publick faſt, to implore the aſſiſtance of God, and that faſt being ended, St. John, filled with the Holy Ghoſt, broke out into theſe words. "In the beginning was the word," &c. The ancients aſſign two reaſons for this undertaking: the firſt is, becauſe in the other three goſpels, there was wanting the hiſtory of the beginning of Jeſus Chriſt's preaching, till the impriſonment of John the Baptiſt, which, therefore, he applied himſelf particularly to relate. The ſecond reaſon was in order to remove the errors of the Cerinthians, Ebionites, and other ſects.

St. JOHN's *Day*, the name of two Chriſtian feſtivals, one obſerved on the 24th of June, kept in commemoration of the wonderful circumſtances attending the birth of St. John the Baptiſt; and the other on the 27th of December, in honour of St. John the Evangeliſt.

JOINDER, or JOYNDER, in law, ſignifies the joining of two perſons in one ſuit againſt another; as for inſtance, if there are two joint-poſſeſſors of goods, and theſe are taken from one of them, they may both join in an action to recover them.

JOINERY, the art of working in wood, or of fitting various pieces of timber together. See CARPENTRY.

JOINT, in general, denotes the juncture of two or more things.

The joints of the human body are called by anatomiſts articulations. See ARTICULATION.

The term joint is alſo applied to the ſeparation between the ſtones or bricks of a building, uſually filled with mortar, plaſter, or cement; alſo by carpenters, to the ſeveral manners of aſſembling or fitting pieces of wood together, as a dove-tail joint, &c

Stiffneſs of the JOINTS, in ſurgery and medicine, ſometimes proceeds from the bones being broken, bruiſed, or wounded, eſpecially about the extreme parts, which being kept in one poſture, in order for cure, the ſynovia of the joints becomes thick, and depraves or quite aboliſhes its motion; or it may proceed from the bony juice proceeding from broken bones, and inſinuating itſelf into the joint. Hoffman ſays, diſeaſes of the joints ſometimes proceed from ſpaſms of the ligament.

JOINT-EXECUTORS, in law, are when two or more perſons are appointed ſuch by will; in which caſe they are accounted but as one ſingle perſon; ſo that the actions done by one of them are taken to be the acts of all, becauſe they all repreſent the perſon of the teſtator.

JOINT LIVES, in law, is where any thing is granted or given to two or more during their lives.

JOINT-TENANTS are ſuch as hold lands or tenements jointly by one title; as where a man grants lands, &c. to perſons and their heirs; ſuch perſons, during their joint tenancy muſt jointly plead as well as be jointly ſued, which is common to them with coparceners of lands.

JOINTURE, in law, generally implies a ſettlement of lands and tenements made on a woman in conſideration of marriage. It alſo ſignifies a covenant, by which the huſband, or ſome friends of his, aſſures lands, &c. to his wife, for the term of her life.

JOISTS, or JOYSTS, in architecture, thoſe pieces of timber framed into the girders and ſommers, on which the boards of the floor are laid. Joiſts are from ſix to eight inches ſquare, and ought ſeldom to lie at a greater diſtance from each other than ten, or at moſt twelve inches, nor ought they ever to bear a greater length than ten feet, or to be leſs into the wall than eight inches. All joiſts on the back of a chimney ought to be laid with a trimmer, at ſix inches diſtance from the back. Some carpenters fur their joiſts, as they call it; that is, they lay two rows of joiſts, one over another, the undermoſt of which are framed level with the under ſide of the lower girder; and the uppermoſt, which lie acroſs the lower ones, lie level with the upper ſide of the girder.

JONAH, or *Prophecy of* JONAH, a canonical book of the Old Teſtament, in which is related, that Jonah was ordered to go and prophecy the deſtruction of the Ninevites; but that diſobediently attempting a voyage another way, he was diſcovered by the riſing of a ſudden tempeſt, and caſt into the ſea, where he was ſwallowed up by a whale, which having lodged him three days and three nights in his belly, diſgorged him upon the ſhore; whereupon being ſenſible of his paſt danger, and ſurpriſing deliverance, he betook himſelf to the journey and embaſſy to which he was appointed; and arriving at Nineveh, the metropolis of Aſſyria, he, according to his commiſſion, boldly laid open to the inhabitants, their ſins and miſcarriages, and proclaimed their ſudden overthrow; upon which the whole city, by prayer and faſting, and a ſpeedy repentance, happily averted the divine vengeance, and eſcaped the threatened ruin.

IONICK ORDER, the third of the five orders of architecture, and is of a more ſlender make than the Dorick or Tuſcan; its appearance is ſimple, yet graceful and majeſtick; its ornaments are few; ſo that it has been compared to a ſedate matron, in decent, rather than magnificent attire. See *Plate* XLIII. *fig.* 1.

Among the ancients, the form of the Ionick profile appears to have been more poſitively determined than that of any other order; for, in all the antiques at Rome (the Temple of Concord excepted) it is exactly the ſame.

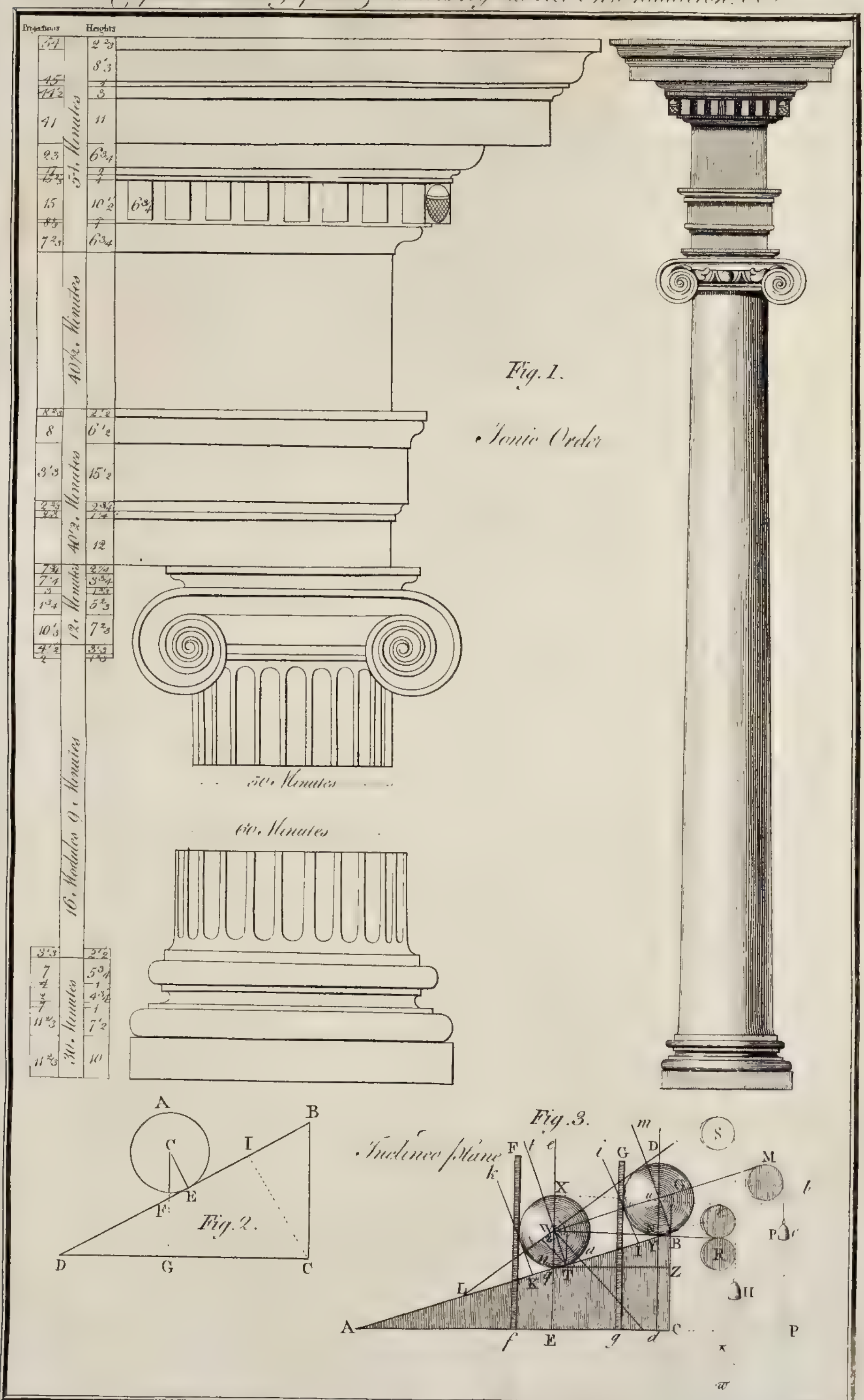
The modern artiſts have likewiſe been unanimous in their opinions; all of them, excepting Palladio and his imitators, having employed the dentil, cornice, and the other parts of the profile, nearly as they are found in the Colliſſeum, the Temple of Fortune, and the theatre of Marcellus.

The height of the Ionick column is 18 modules, and that of the entablature $4\frac{1}{2}$, or one quarter of the height of the column, as in other orders, which is a trifle leſs than in any of the antique Ionicks. In all the antiques, the baſe is attick; and the ſhaft of the column may either be plain, or fluted with 24 flutings, or 20 only, as in the temple of Fortune. The plan of the flutings may be a trifle more than a ſemicircle, as in the forum of Nerva, becauſe they then appear more diſtinct. The fillets, or intervals between them, muſt not be broader than one third of the breadth of a fluting, nor narrower than one fourth. The ornaments of the capital muſt correſpond with the flutings of the ſhaft; and there muſt be an ove above the middle of each fluting. To render it ſtill more beautiful, the volute may be made a little oval and inclining.

IONICK DIALECT, in grammar, a manner of ſpeaking peculiar to the people of Ionia.

IONICK SECT was the firſt of the ancient ſects of philoſophers; the others were the Italick and Ileatick. The founder of this ſect was Thales, who being a native of Miletus in Ionia, occaſioned his followers to aſſume the appellation of Ionick. Thales was ſucceeded by Anaximander, and he by Anaximenes, both of Miletus; Anaxagoras Clazomenius ſucceeded them, and removed his ſchool from Aſia to Athens, where Socrates was his ſcholar. It was the diſtinguiſhing tenet of this ſect that water was the principle of all natural things.

IONICK TRANSMIGRATION was anciently a very celebrated epocha; it took its riſe from the retreat of the Athenian colonies, who, upon the death of Codrus, put



facing Ionic Order

put themfelves under the command of his fon Neleus, and eftablifhed the twelve cities of Ionia in Afia. Thefe colonies, according to Eratofthenes, were eftablifhed fifty years after the return of the Heraclidæ; and, according to Marfham, feventy-feven years after the taking of Troy.

JONQUIL, in botany, the name of a fpecies of Narciffus. See Narcissus.

JOSHUA, a canonical book of the Old Teftament, containing a hiftory of the wars and tranfactions of the perfon whofe name it bears. This book may be divided into three parts; the firft of which is a hiftory of the conqueft of the land of Canaan; the fecond, which begins at the twelfth chapter, is a defcription of that country, and the divifion of it among the tribes; and the third comprifed in the two laft chapters, contains the renewal of the covenant he caufed the Ifraelites to make, and the death of their victorious leader and governor. The whole comprehends a term of feventeen, or, according to others, of twenty-feven years.

JOURNAL, a day-book regifter, or account of what paffes daily.

Journal, or Day-Book, among merchants, is that wherein the tranfactions recorded in the wafte-book, are prepared to be carried to the ledger, by having their proper debtors and creditors afcertained and pointed out; for a more diftinct account of which, fee the article Book-Keeping.

Journal, among feamen, a certain diary of the occurrences that happen from noon to noon in the courfe of the voyage, as winds, weather, fetting and fhifting of fails, and remarking the various courfes and diftances run, which are reduced into one, and corrected by a folar obfervation. Every thing material that happens to the fhip or her crew is alfo obferved particularly in this journal.

IPECACUANHA, in the materia medica, a W. Indian root, of which there are two kinds, diftinguifhed by their colour, and brought from different places, but both poffeffing the fame virtues, though in a different degree. The one is grey, and brought from Peru; the other is brown, and is brought from the Brazils: and thefe are indifferently fent into Europe under the general name of ipecacuanha.

Thefe two forts have been by fome fuppofed to be the roots of two different plants: but this is a miftake; the only difference is, that one grows in a different place, and in a richer and moifter foil, and is better fupplied with juices than the other.

Ipecacuanha is an excellent, mild, and fafe emetick; it is alfo a noble reftringent; and, given in dofes too fmall to vomit, is the greateft of all remedies for a dyfentery. Small dofes of ipecacuanha, are an excellent remedy in diarrhœas of a more fimple kind; and in the fluor albus we hardly know a better medicine.

IRENARCHA, a military officer in the Greek empire, whofe bufinefs was to provide for the peace and fecurity of the provinces.

IRIS, in meteorology, the rain-bow. See Rain-Bow.

Iris, in anatomy, a membrane of the eye, which is a ftriped variegated circle round the pupil. See Eye.

Iris, alfo denotes thofe changeable colours that fometimes appear in the glaffes of telefcopes, microfcopes, &c. fo called from their refemblance to a rain-bow. It is in like manner applied to that coloured fpectrum which a triangular prifmatick glafs will project on a wall, when placed at a proper angle in the fun-beams.

IRON, *Mars*, in natural hiftory, a greyifh metal, foon tarnifhing in the air to a dufky blackifh hue, and in no long time contracting a yellowifh or redifh ruft. It is the moft fonorous of the metals except copper; the hardeft and moft elaftick of them all; hence its excellence for mechanick inftruments: it is made into tools, by which all the others are filed, drilled, and cut; and is the only one that ftrikes fparks with flint. It fpreads difficultly under the hammer, but may be extended to a great degree, drawn into wire, as flender as the fineft hairs: it is more eafily malleable when ignited than when cold; whilft fome of the other metals, though ductile when cold, become quite brittle by heat. It is lighter, confiderably, than copper; and a little heavier than tin. It is the only metallick body which attracts, or is attracted by, the magnet, one of its own ores.

Iron grows red-hot much fooner than any other metal, and this not only from the application of actual fire, but likewife from ftrong hammering, friction, or other mechanick violence. It neverthelefs melts the moft difficultly of all the metals; requiring, in its moft fufible ftate, an intenfe bright white heat. When perfectly malleable, it is not fufible at all, without additions, or the immediate contact of the burning fuel; and when melted, it lofes that quality, which deprives it at the fame time of the other, as if fufibility and malleability were in this metal incompatible.

Solutions of iron made in acids give a yellow ftain to linen, &c. and ftrike a black colour with galls and other vegetable aftringents. Thefe are very valuable properties of iron to the calico-printer, the ftainer of leather, wood, &c. and the dyer. For linen and leather, the metal is commonly diffolved in four whey or fmall beer; for dyeing, the vitriol is made ufe of. This metal affords alfo, in its calces, red and yellow pigments to the painter; and a fine blue in the preparation, called from the place where it was firft difcovered, Berlin or Pruffian blue. A flight folution of vitriol has been employed by fome as an affay liquor for diftinguifhing French brandies from common fpirits prepared in imitation of them; French brandy having ufually an aftringent impregnation from the oaken cafks in which it has been kept, and hence ftriking a bluifh or black colour with the chalybeate folution; whilft fpirits tinctured only with molaffes, burnt fugar, &c. give no fuch colour. The principle on which the blue colour depends, fhews that it is no certain teft: all fpirits will exhibit it if impregnated with aftringents; and French brandies will not, without fuch impregnation.

Iron is exceeding rarely, if ever, found native in the earth. Mr. Lewis fays he never faw a fpecimen of pure native iron; but the maffes which have been fhewn him for fuch, were either not attracted by the magnet, or not diffoluble in aqua-fortis. Its ores on the other hand are extremely plentiful in almoft all parts of Europe: but South America, fo rich in gold and filver, has little of this moft ufeful metal. The richeft ores of iron are compact and ponderous, of a brownifh, redifh brown, or red colour: they fcarcely ever participate of perfect fulphur, the pyritæ excepted, and contain but little foreign matter: fuch are, the magnet, the hæmatites or bloodftone, the common iron-ftone, and ruddle. The running down of the iron-ftone requires no particular management, a ftrong charcoal fire being the principal point.

Smelting of Iron *Ores*.—The ores of iron are commonly calcined previous to the fufion; the harder ones, though they fhould contain nothing fulphureous or arfenical, requiring that procefs to render them pulverable. In the large works, a quantity of the ore is placed on a bottom of wood or charcoal, intermingled with ftrata of the fame kind of fuel; the pile carried up to a confiderable height, and fet on fire.

The fufion is performed in furnaces twenty or thirty feet high, and eight or ten feet wide in the middle, but narrower above and below. The furnace is charged at top with charcoal, and the fire excited by large bellows moved by water. When the whole internal furface appears of a ftrong white heat, the ore is thrown in, by little at a time, with charcoal over it, and commonly a portion of limeftone, the true ufe of which is probably, not as has been generally fuppofed, to abforb fulphur, but to promote the fufion. The ore, gradually melting, drops down through the fuel into the receiver or bottom of the furnace, where a paffage is open for taking off the fcum or drofs. The metal, now in ftrong fufion, is let out, by a tap-hole, into furrows made in a bed of fand: the large mafs, which fets in the main furrow, is called by the workmen a fow, and the leffer ones pigs of iron. Chimney-backs, ftoves, garden-rollers, &c. are formed of this rough metal taken out of the receivers with ladles, and caft into moulds made of fine fand. Two or three tons of iron are run off in twenty-four hours: before the force of water was called in aid to work the bellows, fcarce an hundred weight could be obtained in a day, and a large quantity of the metal was left in the drofs: hence, in fome places, the flags of the old works are now remelted to advantage along with frefh ore. From the richnefs of the flags of different ores left by former times, fome have been mifled into an opinion, that the metal was regenerated in them.

From the great confumption of wood in this bufinefs, and

and its scarcity in some places where there are rich mines of iron, attempts have been made to substitute other fuels. Peat has been found to answer tolerably well: in some parts of England, a quantity of this has for a considerable time been mixed with the charcoal; and a patent has been lately obtained for running down the ore with peat alone. Pit-coal renders the iron hard and brittle: this inconvenience is said to be in a good measure prevented, by previously coaking the coal, as is customary to fit it for the drying of malt.

The impure iron, as run from the ore, is melted down in another furnace, intermixed with charcoal; a strong blast of air being impelled on the surface of the metal, by which its fusion is remarkably promoted. On discontinuing the action of the bellows, the iron thickens into a mass called a loop, which is conveyed under a large hammer raised by the motion of a water-mill. The iron, beat into a thick square, is heated till ready to melt, and forged again: by a few repetitions of this process, it becomes completely malleable, and is at length formed into bars for sale. A large quantity of vitreous scoria separates both in the fusion and the forging: the rough cast iron, obtained from some ores, loses more than half its weight in being made into bars.

Preparation of IRON, in medicine, are, 1. The crude filings, reduced to an impalpable powder, greatly recommended in female disorders.

2. The crocus martis.

3. The flores martiales, or flowers of iron.

4. The sal martis, or salt of iron, which is prepared thus: mix together a quart of water, and eight ounces of the oil of vitriol; pour the oil of vitriol in by a little at a time: put the mixed liquor into a glass-vessel, and add to it four ounces of the filings of iron: when the ebullition is over, evaporate the liquor to a pellicle, and set it to shoot, there will then be a green vitriol or salt found in fair crystals; dry them for use.

This salt is one of the most powerful preparations of this metal; it opens obstructions of all kinds, strengthens the viscera, is an excellent medicine in cachexies, and destroys worms.

5. Tincture of iron, with spirit of salt, is made thus: take filings of iron, half a pound; Glauber's spirit of sea salt, three pounds; rectified spirit of wine three pints: digest the spirit of salt and the filings together, without heat, as long as the spirit will work upon them; then after the fæces have subsided, pour off the clear liquor, evaporate it to one pound, and to this add the spirit of wine. This has the same virtues as the crocus martis. See CROCUS.

6. Chalybeate, or steel-wine, is made in the following manner: take filings of iron, four ounces; cinnamon and mace, of each half an ounce; of rhenish wine, two quarts; infuse them a month, without heat, often shaking the vessel, and then filter it off for use.

This wine is an excellent stomachick and aperient; a moderate glass may be drank once or twice a day, or it may be mixed in apozems of the aperient vegetables.

IRONY, in rhetorick, is when a person speaks contrary to his thoughts, in order to add force to his discourse; whence Quintilian calls it diversiloquium. Thus, when a notorious villain is scornfully complimented with the titles of a very honest and excellent person; the character of the person commended, the air of contempt that appears in the speaker, and the exorbitancy of the commendations, sufficiently discover the dissimulation or irony.

IRRADIATION, the act of emitting subtile effluvia, like the rays of the sun every way.

IRRATIONAL, an appellation given to surd numbers and quantities. See NUMBER, QUANTITY, and SURD.

IRREGULAR, something that deviates from the common forms, or rules; thus we say an irregular fortification, an irregular figure, &c. See FORTIFICATION, &c.

IRREGULAR, in grammar, such inflections of words as vary from the general rule; thus we say, irregular nouns, irregular verbs, &c.

IRREGULAR BODIES are solids not terminated by equal and similar surfaces.

IRREGULAR COLUMN, in architecture, a column which does not only deviate from the proportions of any of the five orders, but whose ornaments, whether in the shaft or capital, are absurd and ill chosen.

ISAIAH, or *the Prophecy of* ISAIAH, a canonical book of the Old Testament. Isaiah is the first of the four greater prophets, the other three being Jeremiah, Ezekiel, and Daniel. This prophet was of royal blood, his father Amos being brother to Azariah, king of Judah. The five first chapters of this prophecy relate to the reign of Uzziah; the vision, in the sixth chapter, happened in the time of Jotham; the next chapters to the fifteenth, include his prophecies under the reign of Ahaz; and those that were made under the reigns of Hezekiah and Manasseh, are related in the next chapters to the end. The stile of this prophet is noble, sublime, and florid. Grotius calls him the Demosthenes of the Hebrews. He had the advantage, above the other prophets, of improving his diction by conversing with men of the greatest parts and elocution, and this added a sublimity, force, and majesty to what he said. He impartially reproved the vices of the age in which he lived, and openly displayed the judgments of God that were hanging over the Jewish nation; at the same time denouncing vengeance on the Assyrians, Egyptians, Ethiopians, Moabites, Edomites, Syrians, and Arabians, who were instrumental in inflicting those judgments. He foretold the deliverance of the Jews from their captivity in Babylon, by the hand of Cyrus king of Persia, an hundred years before it came to pass; but the most remarkable of his predictions are those concerning the Messiah, in which he not only foretold his coming in the flesh, but all the great and memorable circumstances of his life and death.

ISATIS, *woad*, in botany, a genus of plants whose flower consists of four oblong cruciform petals, turning gradually smaller towards the ungues: the fruit is an oblong lanceolated obtuse compressed pod, containing two valves, and consisting of one cell, which inclose an ovate compressed seed in the centre of the fruit.

The common woad which is cultivated in several parts of England for the purposes of dying, is a biennial plant, and raised from the seed, which should be sown in July or August, and afterwards hoed in the same manner as is practised with turnips.

A woad blue is a very deep blue, almost black, and is a blue of so many tints, that the dyers have a scale by which they compose the several casts or degrees of woad, from the brightest to the deepest. With this plant the ancient Britons used to paint themselves: it is not much used in medicine, but accounted very astringent, and effectual in stopping hæmorrhages.

ISCHAEMUM, in botany, a genus of plants producing male and female flowers; the male is a small bivalvular glume, placed on the calyx of the female flower, which is a biflorous gloom; the seed is single, and involved in the calyxes and corollulæ. The whole plant is of a fragrant aromatick smell, and is accounted cephalick.

ISCHIADICK, in anatomy, a name given to two crural veins, called the greater and lesser ischias. See VEIN.

ISCHIUM, in anatomy, the name of a bone described under the article innominata ossa. See INNOMINATA.

ISCHURY, *Ischuria*, in physick, a suppression of urine. The word is Greek, ισχουρια, and formed from ισχω, to retain, and ουρον, urine.

Women with child are often troubled with an entire suppression of urine; the most general causes of which are gravel and stone, an inflammation of the neck of the bladder, owing to the piles; or a strangulation of the neck of the bladder betwixt the os pubis and head of the child, when it is sunk down very low.

In the two first cases, general remedies, as bleeding, emollient clysters, and gentle purges with softening decoctions, are of great use; but nothing gives so speedy a relief as a catheter. But when the head of the child is sunk very low, and presses strongly against the os pubis, the catheter will not pass; and then the remedy is to put back the child's head, which immediately gives liberty to the urine to come away without using the catheter.

La Motte makes a distinction betwixt a suppression and retention of urine. In the latter case the patient has frequent motions to make water, without being able to do it. But in a total suppression of urine the patient has seldom or never any inclination to make water, and if any happen, it is done in a moment: this last is the most dangerous.

To discharge the urine by a puncture of the bladder is never undertaken, when relief can be had from inter-

nal

nal medicines, or the introduction of the catheter. 1. When the neck of the bladder is greatly inflamed, whereby the urethra is contracted. 2. A caruncle, cicatrix, or hard tubercle may obstruct the passage. 3. The introduction of the catheter in old men is sometimes impracticable from the stricture or wrinkles of the urethra. 4. From the distention of its spongy substance with blood. 5. From a scirrhosity or preternatural tumour of the prostate gland. Lastly, from a stone lodged in the neck of the bladder. Upon such occasions recourse must be had to this operation; and among the various methods made use of, Heister prefers the following, namely, to make an incision on the left side of the suture of the peritonæum into the body of the bladder, so as not to injure its neck, with a trochar and cannula. After which the perforator is extracted, but the cannula remains there for the more ready discharge of the urine, by which means both the operation and cure are greatly facilitated. Nor is it improper to pass one or two fingers into the anus for the better direction of the instrument into the bladder, and the preservation of the rectum.

When the cause is removed, the tube may be extracted, and the wound healed by the application of balsam of capivi.

ISINGLASS, see ICHTHYOCOLLA.

ISLAND, *Isle*, a tract of land, quite encompassed with salt or fresh water: and thus it stands contradistinguished from the continent or terra firma Several naturalists are of opinion that islands were formed at the deluge; others think that they have been rent and separated from the continent by violent storms, inundations, and earthquakes. These last have observed, that the E. Indies which abound in islands more than any other part of the world, are likewise more annoyed with earthquakes, tempests, lightning, vulcanos, &c.

ISLES, in architecture, the sides or wings of a building.

ISOCHRONAL, ISOCHRONE, or ISOCHRONOUS, is applied to such vibrations of a pendulum, as are performed in the same space of time, as all the vibrations or swings of the same pendulum are, whether the arches it describes be longer or shorter: for when it describes a shorter arch, it moves so much the slower, and when a long one proportionably faster.

ISOCHRONAL LINE, that in which a heavy body is supposed to descend without any acceleration. See ACCELERATION.

ISOMERIA, in algebra, a method of freeing an equation from fractions, by reducing them to one common denominator, and then multiplying each member of the equation by that common denominator. This is the same with conversion of equations.

ISOPERIMETRICAL FIGURES, such as have equal circumferences. It is demonstrated in geometry, that among Isoperimetrical figures, that is the greatest which contains most sides or angles. Hence it follows, that the circle is the most capacious of all figures which have the same circumference with it. That of two Isoperimetrical triangles, which have the same base, and one of them two sides equal, and the other unequal; that is the greater whose sides are equal. That of Isoperimetrical figures, whose sides are equal in number, that is the greatest which is equilateral and equiangular.

ISOSCELES, TRIANGLE, in geometry, a triangle which has two equal sides, as A B C (*plate* XLI. *fig*. 6.) where the side A B is equal to A C, and a line drawn from the top or vertex A, cutting the base into two equal parts at D, is perpendicular to the base.

ISSUANT, *issuing*, in heraldry, when a lion or other animal, in a coat of arms, seems just coming out from under a chief, fesse, house, wood, &c. and only shews half his body.

ISSUE, in law, denotes the children begotten between a man and his wife; sometimes the profits arising from amerciaments or fines; sometimes the profits of lands and tenements; but more frequently, a point in any matter depending in suit, upon which the parties join, and put their cause to the trial of a jury. Issue in this last sense is either general or special.

General ISSUE, that whereby it is referred to a jury of 12 men to bring in their verdict, whether or no the defendant hath done any such thing as the plaintiff lays to his charge. Thus if it be an offence against any statute, and the defendant plead not guilty, this being put to a jury is called a general issue: and in like manner, if a man complain of any private wrong, which the defendant denies, and pleads no wrong, nor disseisin, and this be referred to a jury, it is likewise the general issue.

Special ISSUE, that wherein special matters being alledged by the defendant, both parties join on this point, and go to a demurrer, if it be a point of law; or to a trial by a jury, if it be a question about any fact; as in assault and battery, where the defendant pleads that the plaintiff struck first.

ISSUES, in physick, small artificial apertures made in a fleshy part of the body, to drain off superfluous or noxious humours.

ITCH, a disease of the skin, which is corrupted by a sharp humour, and attended by a violent itching.

This troublesome disease is occasioned by minute insects, which lay their eggs in the furrows of the skin, where they are soon hatched by the natural warmth of the body, and gnaw and tear the fibres. It is easily cured by washing the pustles often with a solution of nitre in water. See IMPETIGO.

ISTHMIA, or ISTHMIAN GAMES, ισθμια, one of the four solemn games which were celebrated every fifth year in Greece; so called from the Corinthian isthmus, where they were kept.

ITINERANT JUDGES, a name formerly given to those judges who were sent into several counties to hear causes.

JUBILEE, a time of publick and solemn festivity among the antient Hebrews. This was kept every 50th year: it began about the autumnal equinox, and was proclaimed by sound of trumpet throughout all the country. At this time all slaves were released, all debts annihilated, and all lands, houses, wives and children, however alienated, were restored to their first owners. During this whole year all kind of agriculture was forbidden, and the poor had the benefit of the harvest, vintage, and other productions of the earth, in the same manner as in the sabbatick, or seventh year. As this was designed to put the Israelites in mind of their Egyptian servitude, and to prevent their imposing the like upon their brethren, it was not observed by the gentile proselytes.

JUDE, the epistle of, a canonical book of the New Testament, calculated to correct the disorderly lives and impious doctrines which had corrupted the faith and morals of the Christians. St. Jude draws them in lively colours, as men giving up to their passions, full of vanity, conducting themselves by worldly wisdom, and not by the Spirit of God.

In the early ages of Christianity, several rejected this epistle because the apocryphal book of Enoch and the ascension of Moses are quoted in it. Nevertheless, it is to be found in all the ancient catalogues of the sacred writings: and Clement of Alexandria, Tertullian and Origin, quote it as written by Jude, and reckon it among the books of sacred scripture.

JUDGE, a chief magistrate of the law, appointed to hear criminal causes, to explain the laws, and to pass sentence according to the verdict brought in by the foreman of the jury.

Book of JUDGES, a canonical book of the Old Testament, so called from its relating the state of the Israelites, under the administration of many illustrious persons who were called judges, from their being both the civil and the military governors of the people, and who were raised up by God upon special occasions, after the death of Joshua, till the time of their making a king. In the time of this peculiar polity, there were several remarkable occurrences, which are recorded in this book. It acquaints us with the gross impiety of a new generation which sprung up after the death of Joshua, and gives us a short view of the dispensations of God towards this people, sometimes relieving and delivering them, and at others, severely chastising them by the hands of their enemies.

The book of Judges is usually divided into two parts; the one containing the history of the judges from Othniel to Sampson, which ends with the 16th chapter; the other containing several memorable actions, which were performed in or about the time of the Judges, from the 17th chapter to the end of the book. The author of this book is wholly unknown: some ascribe it to Samuel, others to Hezekiah, and others to Ezra.

JUDGMENT, among logicians, a faculty, or rather act of the human soul, whereby it compares its ideas, and perceives their agreement or disagreement. See KNOWLEDGE.

JUDGMENT, in law, the sentence of the judges upon a suit, &c.

JUDGMENTS *for Crimes*, in case of treason or felony, must be by an express sentence, an outlawry, or abjuration: and no judgment can be inflicted contrary to law, or that is not appointed by act of parliament.

JUDGMENTS *for Debts*, are acknowledged by a person's giving a general warrant of attorney to any attorney of the court in which it is to be acknowledged, to appear for him at the suit of the party to whom the same is to be done, and to file common bail, receive a declaration, and then to plead, non sum informatus, I am not informed; or to let it pass nihil dicit, he says nothing; upon which judgment is entered for want of a plea.

JUGERUM, in Roman antiquity, a square of 120 Roman feet; its proportion to the English acre being as 10,000 to 16,000 and 97. See MEASURE.

JUGULAR, in anatomy, an appellation given to two veins of the neck, which arise from the subclavians: 1. The external jugular, distributed over the external parts of the head, and which in its several parts receives different denominations from them, as the frontal, temporal, occipital, &c. vein. 2. The internal jugular, which gives ramifications to the larynx, the pharynx, the muscles of the os hyoides, and to the tongue; those which are under its vertex being called raninæ. But besides these branches, its trunk terminates in a diverticulum, called a jugular sack, and brings back the blood from the sinuses of the dura mater, and from the brain. There are also certain glands in the anterior part of the neck, called jugular.

JUICE, a liquid substance that constitutes part of the composition of plants, being diffused through their solid parts, and serving for their growth and nourishment. This is the same to plants, as blood is to animals. There are juices of divers kinds, and of all tastes and colours. Dr. Lister observes, that most juices of plants coagulate; and he adds, that as the juices of plants seem to be compounded of liquors of different kinds, it is probable, if the caseous part be narcotick, the whey may not be so; or the one may be hurtful, and the other a good medicament.

JUICE also denotes the fluids or humours in an animal body.

Pancreatick JUICE, a kind of liquor secreted in the glands of the pancreas.

JUJUBES, *Jujubæ*, in the materia medica, the name of a fruit of the pulpy kind, produced on a tree called by authors ziziphus, which Linnæus makes a species of rhamnus.

JULEP, *julap*, *juleb*, *Julepus*, and *Julapium*, in pharmacy, an alterative medicine, unknown to the ancient Greeks, and invented by the Arabians, composed chiefly of distilled waters, &c. and sweetened with sugar or proper sirups.

JULIAN YEAR, in chronology, the old account of the year, so called from its founder Julius Cæsar; and by that name is distinguished from the new or Gregorian account, which is now to be used in England, and is followed in most parts of Europe. See BISSEXTILE.

JULIAN *Period*, in chronology, a period so called, as being adapted to the Julian year. It is made to commence before the creation of the world. Its principal advantage lies here, that the same years of the cycles of the sun, moon, and indiction, of which three cycles it was made to consist by Joseph Scaliger in 1580, belonging to any year of this period, will never fall together again till after the expiration of 7980 years. There is taken for the first year of this period, that which hath the first of the cycle of the sun, the first of the cycle of the moon, and the first of the indiction cycle, and so reckoning on.

The first year of the Christian æra is always, in our systems of chronology, the 4714th of the Julian period.

To find what year of the Julian period any given year of Christ answers to. To the given year of Christ add 4713, because so many years of the Julian period were expired before A. D. 1; and the sum gives the year of the Julian period sought. On the contrary, having the year of the Julian period given, subtract 4713, and the remainder will be the year sought.

JULUS, in botany, the same with what is otherwise called catkins or amentaceous flowers. See the article AMENTACEOUS.

JULUS is also the name of an insect very common among rubbish, and called in English the gally-worm: it is furnished with a great number of feet, has the power of rolling itself up like a ball when touched, and is esteemed a very valuable medicine in the jaundice and suppression of urine.

JULY, in chronology, the seventh month of the year, so called in honour of Julius Cæsar; before whose time it was known by the name of quintilis, as being the fifth month of the old Roman year.

JULY-FLOWER. See CARNATION and STOCK.

JUMENTA, in zoology, the name by which Linnæus calls the sixth order of quadrupeds, the characteristick of which is, that the teeth of all the animals belonging to it are placed in a different manner from those in the other five orders. To this order belong the elephant, rhinoceros, hippopotamos, horse, and hog.

JUNE, the sixth month of the civil year, during which the sun enters Cancer.

JUNIPER, a well-known ever-green shrub, growing in many parts of Europe, in woods and mountainous places.

The berries are supposed to contain the whole virtues of the plant, and should be chosen fresh, plump, full of pulp, and of a strong taste; and these, when used in medicine, are powerful attenuants, diureticks, and carminatives: they dissolve viscid humours in the first passages, and are consequently a remedy for the flatulencies which these disorders occasion. They are given in cases of the gravel and other nephritick complaints, in infractions of the viscera, and in suppressions of the menses; and are often made ingredients in clysters.

The berries chewed, or the essential oil taken only in a few drops, give the urine the same sweet violet-scent that it has after taking turpentine. But these berries are not to be given indiscriminately; for in hot habits they often counteract the very purposes intended to be answered by them, and their use succeeded with heat, even suppression of urine, flatulencies, and swellings of the stomach and intestines: therefore, in all cases where there is danger of an inflammation, either in the primæ viæ or in the kidnies, the use of juniper-berries is to be avoided. We keep no preparation of them in the shops, except the essential oil made by distillers with water in the usual way; and this is seldom made at home, but the imported kind is commonly adulterated with oil of turpentine. We used to keep a distilled spirituous water of juniper in the shops; but the vulgar getting an opinion of its being a pleasant dram, the making of it became the business not only of the apothecary, but of the distiller, who sold it under the name of geneva. See GENEVA.

JUNK, in the sea language, old cables cut into short pieces, and given to boatswains for making swabs, plats, and nippers; as also to the ship-carpenters, and to poor people, to be picked into oakam, for caulking ships, &c.

JUNO, in astronomy, the name by which some call the second of Jupiter's satellites. See JUPITER.

JUNTA, JUNTO, or JUNCTO, in matters of government, denotes a select council for taking cognizance of affairs of great consequence, which require secrecy.

IVORY, *Ebur*, in natural history, &c. a hard, solid, and firm substance, of a white colour, and capable of a very good polish. It is the tusk of the elephant, and is hollow from the base to a certain height, the cavity being filled with a soft medullary substance. These tusks grow on each side of the elephant's trunk in form of a horn. Each tusk is seven or eight feet in length, and as thick as a man's thigh at the base, and almost solid; and both together sometimes weigh about three hundred and thirty pounds.

JUPITER, ♃, in astronomy, one of the superior planets, remarkable for his brightness. It has two signs of the zodiack, called its houses; viz. sagettary, ♐, and pisces, ♓. See *plate* IV. *fig*. 9 and 12. See PLANET.

JUPITER, in alchymy, denotes the philosopher's gold.

JUPITER, in chemistry, denotes tin.

JURATS, *Jurati*, magistrates in the nature of aldermen, that govern corporations, together with the mayors or bailiffs.

JURISCONSULTUS, by contraction J C*tus*, among the Romans, a perſon learned in the law, who was conſulted on the interpretation of the laws and cuſtoms, and difficult points in law-ſuits.

JURISDICTION, a power veſted in any perſon to do juſtice in caſes of complaint that are brought before him.

JURISPRUDENCE, the ſcience of the laws, rights, cuſtoms, ſtatutes, &c. neceſſary for the diſtributing juſtice.

JURIS UTRUM, in law, is a writ in behalf of a clergyman, whoſe predeceſſor has alienated the lands belonging to his church.

JUROR, in law, ſignifies any perſon ſworn on a jury.

JURY, in law, denotes 24 or 12 men ſworn to enquire of a matter of fact, and declare the truth, upon ſuch evidence as ſhall be delivered them touching the matter in queſtion. The jury is to be choſen out of the ſame rank with the perſon accuſed; and, if he be a foreigner, he may demand a jury half foreigners and half Engliſhmen.

Juries are, in theſe kingdoms, the ſupreme judges in all courts and in all cauſes in which either the life, property, or reputation of any man is concerned: this is the diſtinguiſhing privilege of every Briton, and one of the moſt glorious advantages of our conſtitution; for as every one is tried by his peers, the meaneſt ſubject is as ſafe and free as the greateſt.

All criminal cauſes muſt firſt be tried by a grand jury, which commonly conſiſts of 24 men of greater note than the petit jury, who are choſen indifferently out of the whole country, and no man can ſuffer the diſgrace of being tried in any ignominious cauſe, without their firſt finding him guilty; if they find him innocent, he is immediately diſcharged; but if otherwiſe, they only find an indictment, on which he is tried, and finally acquitted or convicted by the verdict of the petit-jury, who are not only to be returned from the county, where the fact was done, but near neighbours, ſuch as are moſt ſufficient and leaſt ſuſpicious; to prevent partiality, the names of the perſons impannelled are wrote on ſeveral pieces of paper of equal ſize, and delivered by the under-ſheriff to the judges's marſhal, who cauſes them to be rolled up, all in the ſame manner, and put together in a box, and when any cauſe is brought to trial, ſome indifferent perſon is to draw out twelve of theſe papers, and the perſons whoſe names are drawn, if not challenged, are to be the jury to try the cauſe; and in caſe any are challenged, and ſet aſide, or do not appear, then a further number is to be drawn till there is a full jury.

JURY-MASTS, in the marine, certain ſpare maſts which are erected in a ſhip, when the others are carried away by the violence of a ſtorm, or otherwiſe.

JUST, a ſportive combat on horſeback, man againſt man, armed with lances.

JUSTICE, *Juſtitia*, in a moral ſenſe, is one of the four cardinal virtues, which gives every perſon his due.

JUSTICE, *Juſticiarius*, in a legal ſenſe, a perſon deputed by the king to adminiſter juſtice to his ſubjects, whoſe authority ariſes from his deputation, and not by right of magiſtracy.

JUSTICES *of the Peace*, are perſons appointed by the king's commiſſion to keep the peace of the county in which they reſide; and ſome of theſe, who are ſuperior in rank or quality, are called juſtices of the quorum, and without the preſence or aſſent of theſe, or at leaſt one of them, no buſineſs of importance can be diſpatched.

JUSTICES *within Liberties*, are juſtices of the peace who have the ſame authority in cities or other corporate towns as the others have in counties, and their power is the ſame, only theſe laſt have the aſſize of ale and beer, wood and victuals, &c.

JUSTICE-SEAT is the higheſt foreſt court, always held before the lord chief juſtice in eyre of the foreſt; in which court fines are ſet for offences, and judgments given.

JUSTICIARY, or *Court of* JUSTICIARY, in Scotland, a court of ſupreme juriſdiction of all criminal caſes.

JUSTIFICATION, in law, ſignifies a maintaining or ſhewing a ſufficient reaſon in court, why the defendant did what he is called to anſwer.

JUSTIFICATION, in a religious ſenſe, is a gracious act of God, whereby he pardons and accepts of ſinners on account of Chriſt's righteouſneſs imputed to them, and received by faith. *Rom.* v. 16, 18.

It ſometimes ſignifies a proof, or confirmation of our juſtification; as *Rom.* iv. 25. *Who* [viz. JESUS CHRIST] *was delivered for our offences, and was raiſed again for our juſtification.*

IVY, *Hedera*, in botany, a well-known evergreen plant, frequently to be met with growing againſt trees, walls, houſes, and churches. The leaves are angular, and the flowers, which grow in an umbel, have each five oblong patent petals, with their points incurved. The fruit is a globoſe berry, of a dark colour, having one cell incloſing four or five large ſeeds, convex on one ſide, and angulated on the other. The berries are frequently given by the common people as a febrifuge; they purge up and down.

Ground-IVY, *Glechoma*, in botany, a low plant, which grows naturally on banks, &c. in many parts of England. The leaves are roundiſh, an inch broad, hairy, and crenated; the flowers grow on the top of the ſtalks, and are monopetalous and ringent, moderately large, and of a blue colour. The ſeeds are oval, and four in number, which are contained in the cup. This plant is of a pungent, nitrous, and earthy taſte, and is very opening, diſcutient, and vulnerary: it is not only preſcribed in all diſtempers of the lungs and breaſt, but alſo accounted good in obſtructions of the viſcera; for which reaſon it paſſes for an hepatick, ſplenetick, diuretick, and nephritick.

K.

K, A double consonant, and the tenth letter of the alphabet. It is borrowed from the Greek K, Kappa, which was made from the old Hebrew Caph, when reverted. It was but little used among the Latins; and Priscian looked on it as superfluous, and says it was never used except in words borrowed from the Greek; we seldom, it is true, meet with it in Latin authors, except in *kalendæ*, instead of *colendæ*.

This letter is formed in the voice by a guttural expression of the breath through the mouth, together with a depression of the lower jaw, and opening of the lips and teeth. It has much the same sound as the hard sound of C, and is generally used only before *i*, *e*, and *n*, in the beginning of words, where the hard sound of *c* is formed, as in *kill*, *ken*, *knave*, &c.

K is also a numeral letter, denoting 250, according to this following verse;

K quoque ducentos & quinquaginta tenebit.

When it had a stroke at top, $\overline{K}$, it stood for 250,000.

KÆMPFERIA, in botany, a genus of plants, the flower of which consists of a single petal, with a long slender tube, and the limb is divided into six segments: the fruit is a roundish and somewhat trigonal capsule, with three cells, each containing a considerable number of seeds.

The roots of this plant are the galangals of the shops. See Galangals.

KALI, glasswort, in botany, a plant with spreading, redish, pretty thick branches; oblong, narrow, pointed, fleshy leaves, like those of the house-leeks; and imperfect flowers in the bosoms of the leaves, followed each by one seed spirally curled and inclosed in the cup. It is annual, and grows wild on the sea-coasts in the southern parts of Europe, particularly of the Mediterranean.

Of the ashes of Kali is made soap, glass, alkali-salt, potash, &c. See these articles. The method of preparing it is this: when dry, they burn it in certain pits, dug in the ground, which are close covered up with earth, so that no air can come at the fire: by this means the matter is not only reduced to ashes, but made into a very hard stone, like rock-salt, which they are forced to break with hammers to get it out. The best sort is in little dry stones, of a blueish-grey colour, and full of little eyes or holes. See Alcali.

KAOLIN, one of the substances whereof China-ware is made; being no other than a kind of talck reduced to powder, and made into a paste with water. The peculiar property of kaolin is, that it is very difficultly, if at all, vitrifiable: so that being mixed with petunse, a substance easily vitrifiable, the mixture produces a semivitrification in the fire, which is what we call china or porcelain.

KEBLA, an appellation given by the Mahometans to that part of the world where the temple of Mecca is situated, towards which they are obliged to turn themselves when they pray.

KECKLING, among sailors, certain pieces of rope wound about the cable, to prevent it from being fretted or chafed by the ship's stem or bow.

KEDGE-ANCHOR, among sailors, a small anchor used in harbours and rivers, either to remove the ship from one place to another, by the help of certain transporting ropes, called warps, or to keep her steady as she rides at anchor, especially at the turn of the tide, when she may come so nigh it as to entangle the flooks of it with her cable, if not kept from it by the kedge. See Anchor.

KEEL, in naval architecture, the principal piece of timber first laid upon the blocks, which supports the whole fabrick of a ship in the same manner as the backbone sustains the human body. When this cannot be had of a sufficient depth in one piece, there is a strong thick plank fastened to the bottom, called the false-keel, which also serves to save the bottom of the main-keel.

Keel is also a vessel employed in divers parts of Northumberland to bring coals down the rivers to the ships, into which they discharge them for exportation.

KEELSON, or Kelson, is the upper part of the keel, or that part of it which is within the ship. It is laid over the floor timbers, and bolted through them to the keel; this is also, like the keel, of three or four pieces of timber scarfed together.

KEEPER, *or chief Warden of the Forest*, an officer who has the chief government of a royal forest, and the check of the other officers. The lord chief justice in eyre, when he is to hold his justice-seat, sends out his general summons to the keeper forty days before, that all under-officers may have proper warning to appear at a day assigned.

Keeper *of the great Seal*, is a lord by his office. He is one of the king's privy-council, through whose hands pass all charters, commissions, and grants of the king under the great seal, without which all such instruments are, by law, of no force. He has the same authority, pre-eminence, &c. as the lord chancellor has for the time being, and both offices are now executed by him.

Keeper *of the privy Seal*, a lord by his office, through whose hands pass all charters signed by the king, before they come to the great seal, and some things which do not pass the great seal at all. He is a privy-counsellor, and was anciently reckoned one of the great officers of the realm.

KELP, a fixed salt, or particular species of alcaline salt, procured by burning the weeds which grow plentifully on some shores, and reducing it to solid lumps or cakes of ashes.

KENKS, in the sea-language, doublings in a rope or cable, when handed in and out, so that it does not run easy; or when any rope makes turns or twists, and does not run free in the block, then it is said to make kenks.

KERMES, round redish-brown grains, about the size of peas; found in Spain, Italy, and the southern parts of France, adhering to the branches of the scarlet oak. These grains appear, when fresh, full of minute redish ova or animalcules, of which they are the nidus, and which in long keeping change to a brownish red powdery substance. They are cured by sprinkling with vinegar before exsiccation: this prevents the exclusion of the ova, and kills such of the animals as are already hatched; which would otherwise become winged insects, and leave the grain an empty husk.

Fresh kermes yields upon expression a red juice, of a light pleasant smell, and a bitterish, subastringent, somewhat pungent taste: this juice or sirup made from it, are brought from the south of France, and sometimes made use of as mild restringents and corroborants. An elegant cordial confection, for these intentions, is prepared in the shops, by dissolving in the heat of a water bath, six ounces of fine sugar in six ounces by measure of damask rose water, then adding three pounds of the juice of kermes warmed and strained, and after the whole has grown cold, mixing in half a scruple of oil of cinnamon: this confection is taken from a scruple to a dram or more; either by itself, or in juleps, with which it mingles uniformly without injuring their transparency. The dried grains, if they have not been too long kept, give out, both to water and to rectified spirit, the same deep red colour, and nearly the same kind of smell and taste, with those of the expressed juice. See Alkermes.

Kermes-mineral, *Pulvis Carthusianorum*, in pharmacy, a preparation of antimony, made up in the following manner. Take of antimony, four pounds; solution of fixt nitre per deliquium, one pound; rain water, three pounds; boil them two hours, and then filter the

boiling

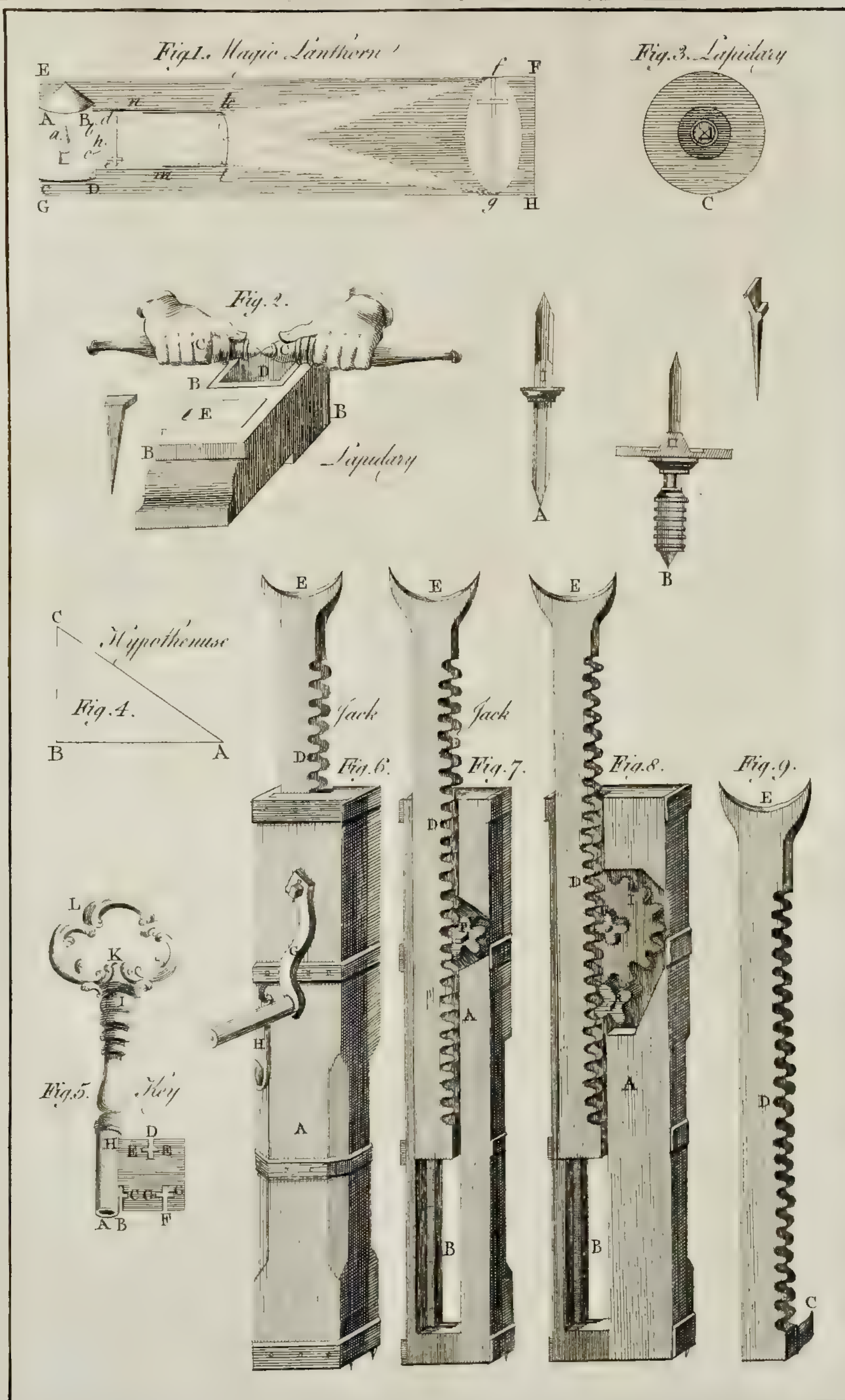


Fig.1. Magic Lanthorn
E
F
A
B
a
b
c
d
h
n
k
f
m
C
D
G
g
H
Fig.3. Lapidary
C
Fig.2.
B
C
D
E
B
B
Lapidary
A
B
C
Hypothenuse
Fig.4.
B
A
E
E
E
Jack
Jack
D
Fig.6.
Fig.7.
Fig.8.
Fig.9.
E
D
D
F
A
A
H
A
B
B
D
C
L
K
Fig.5.
Key
D
H
E
E
C
C
A
B
F

 facing Key

boiling decoction through paper; let it ſtand at reſt twenty-four hours, and it will let fall a yellowiſh or ſaffron-coloured powder, the fluid becoming clear. This fluid being then poured off by inclination, the powder muſt be waſhed by repeated effuſions of warm water, and four ounces of ſpirit of wine being burnt upon it, afterwards kept for uſe.

This powder, according to Quincy, is a moſt efficacious deobſtruent, and therefore extremely uſeful in ſcrophulous obſtinate, ſcorbutick, and all ſuch caſes as ariſe from glandular obſtruction, as likewiſe in chloretick, cachectick, and hyſterical habits, where the vitiated craſis of the blood has impaired the vis vitæ, and debilitated the ſecretive powers: it has been recommended alſo in fevers; but the uſe of medicines of this claſs, is not yet ſufficiently authorized by experience, to render ſuch a practice eligible.

KERNING, in the ſalt-works, implies the cryſtallization of ſalt.

KETCH, in marine affairs, implies a veſſel with two maſts, a main and a mizzen-maſt. The principal uſe of this ſort of veſſel is to bombard a place, being furniſhed with mortars, bombs, carcaſes, &c. for this employment, and built remarkably ſtrong to encounter the ſhock of firing ſhells for a continuance.

KETTLE-DRUM, in the art of war. See DRUM.

KEVELS, in ſhip-building, a ſort of frame compoſed of two pieces of wood thruſt into a third, which is bolted to the inſide of the ſhip; the uſe of which is to faſten ſome rope to, but more particularly the main and fore ſheets.

KEY, *Clavis*, the names of the ſeveral parts of a key are theſe: A (*plate* XLIV. *fig.* 5.) is the pin-hole, drilled into the end of the ſhank H; B is the ſtep, or dap-ward; C, the hook-ward; D, the middle-ward; E E, the croſs-ward; F, the main-ward; G G, croſs-ward; I, the pot; K, the bow-ward; L, the bow, or handle; and B F E D, &c. the piece of ſteel, containing the wards, is called the bit of the key. Keys are prohibited to be imported.

KEY, in muſick, a certain fundamental note, or tone, to which the whole piece, be it in concerto, ſonata, cantata, &c. is accommodated, and with which it uſually begins, but always ends. See CLEFF.

KEY is alſo uſed for an index, or explanation of a cypher.

KEYS likewiſe denote thoſe little pieces in the fore part of an organ, ſpinnet, or harpſichord, whereby the jacks are played, ſo as to ſtrike the ſtrings of the inſtrument, and wind is given to the pipes by raiſing and ſinking the ſucker of the ſound-board.

KEY-STONE *of an Arch*, or *Vault*, that placed at the top or vertex of an arch, to bind the two ſweeps together.

KIDNEYS, *Renes*, in anatomy, are two red viſcera of an oblong figure, ſituated at the loins, one on each ſide; their hollow ſide being turned inward, and their convex ſide outward. They are placed near the loweſt ſpurious ribs; but their ſituation is not exactly regular; for in ſome ſubjects they are a little higher, and in others a little lower; and one of them is not unfrequently placed a little above the other: it is not always the ſame kidney that is placed higheſt; but ſometimes the right, and ſometimes the left; however, they are ſometimes perfectly even.

The kidneys are connected with the loins, the lower ribs, the colon, the ſuccenturiati, the renal veſſels, and the ureters. They have two membranes, the one robuſt and common, called the adipoſe membrane: this ſurrounds them but looſely, and is furniſhed with its own proper veſſels. The other membrane is proper, and is very thin, and every where applied cloſely to the ſubſtance of the kidneys.

The length of the kidneys is five or ſix fingers, the breadth three, and the thickneſs about a finger and a half. Its ſurface, in adults, is ſmooth and equal, but in the fœtus in human ſubjects, and in grown animals of many kinds, it is irregularly divided, as it were into a number of lobes.

The veſſels of the kidneys, are, like thoſe of the liver, included in a membrane, from the peritonæum. The arteries and veins are large, and called emulgents, and venal veſſels; theſe are produced from the aorta and vena cava. The nerves are from the plexus renalis; and there is a large excretory duct, called the ureter. There are alſo a number of lymphaticks, paſſing to the receptaculum chyli. The ſubſtance of the kidneys is firm and hard, and is of two kinds. 1. The exterior, or cortical, which, according to Malpighi, is glandulous; but according to the diſcoveries of Ruyſch, is throughout elegantly vaſculous. 2. The interior, which is tubulous, and expreſſed by the name of tubuli urinarii Bellini: this terminates in 10 or 12 papillæ, which open by a multitude of apertures into the pelvis; but theſe papillæ are not found in all ſubjects.

The uſe of the kidneys is to ſecrete the urine from the blood, into the pelvis. See *Pelvis*, &c.

KILDERKIN, a kind of liquid meaſure in England that contains two firkins, or 18 gallons, beer meaſure, and 16 ale meaſure. Two kilderkins make a barrel, and four a hogſhead.

KING, a potentate, who rules ſingly and ſovereignly over a people; he is more or leſs limited, according to what country he governs.

KING *at Arms*, or *of Arms*, an officer who directs the heralds, preſides at their chapters, and has the juriſdiction of armory. There are three kings of arms in England, namely, Garter, Clarencieux, and Norroy.

Garter principal KING *at Arms*. He, among other privileges, marſhals the ſolemnities at the funerals of the prime nobility, and carries the garter to kings and princes beyond ſea, being joined in commiſſion with ſome peer of the kingdom. See GARTER.

Clarencieux KING *at Arms*, ſo called from the duke of Clarence, to whom he firſt belonged. He marſhals the funerals of baronets, knights, eſquires, and gentlemen on the ſouth ſide of Trent.

Norroy KING *at Arms* does the ſame on the north ſide of Trent; and theſe two laſt are called provincial heralds, as dividing the kingdom between them into two provinces.

Theſe, by charter, have power to ſet down noblemens pedigrees, diſtinguiſh their arms, appoint perſons their arms, and, with Garter, direct the other heralds.

Latterly the earl marſhal of England, by ſpecial commiſſion, to perſonate the king, creates the kings at arms.

Lion KING *at Arms*, for Scotland, is the ſecond king at arms for Great Britain; he is inveſted and ſolemnly crowned. He publiſhes the king's proclamations, marſhals funerals, reverſes arms, appoints meſſengers at arms, &c.

KING'*s-Bench*, *Bancus Regius*, in law, a court held in Weſtminſter-hall, ſo called, in regard the king is ſuppoſed to ſit in perſon as judge of the court, and may do ſo whenever he pleaſes: wherefore all writs, &c. in this court, are made returnable coram nobis, and not coram juſticiariis noſtris, as in the common-pleas.

The judges are the lord chief juſtice, and three other puny juſtices. Here are principally determined matters relating to the crown and the peace. When any are aggrieved by an order of juſtices or quarter-ſeſſions, they have recourſe hither: the rights of election of mayors, bailiffs, conſtables, &c. are, upon mandamuſes, ſettled here, and prohibitions iſſued to ſtay proceedings in the eccleſiaſtical court. Here any debt or contract may be ſued for, as well as in any other court, and may as expeditiouſly proceed.

KINK. See KENKS.

KITCHEN GARDEN, a piece of ground laid out for the cultivation of fruit, herbs, pulſe, and other vegetables uſed in the kitchen.

A kitchen-garden ought to be ſituated near the ſtables, from whence the dung may be eaſily conveyed into it. The beſt figure for a kitchen-garden, and moſt convenient for culture, is either a ſquare or an oblong; theſe forms can moſt conveniently be divided and ſubdivided into right-angled pieces for each particular crop, which cannot ſo well be done in an irregular figure: but what is of more conſideration, is the choice of a good ſoil, not too wet nor too dry, but of a middling quality, eaſy to work, and by no means over-ſhadowed by trees, buildings, &c. ſo as to be entirely free to the ſun and air, except the north ſide, where a diſtant plantation is very proper to preſerve the early crops from being damaged in the ſpring by the cold winds; but theſe plantations ſhould not be too near, nor very large; for it has been found, where kitchen-gardens are

are placed near woods, or large plantations, they have been much more troubled with blights in the ſpring than thoſe which have been more expoſed.——This ground ſhould be walled round; againſt which may be trained different ſorts of fruit-trees; the borders adjoining to them may be about eight or ten feet, which will give the roots of the trees liberty to extend, and alſo are of uſe on the ſouth ſide to raiſe many ſorts of early plants; and thoſe expoſed to the north, are ſerviceable for plants of later growth; avoiding thoſe ſorts which are deep rooted.

In the diviſion of the ground, it ſhould be laid out in quarters, according as the figure of it will admit: theſe quarters ſhould be proportioned to the whole; if they are too ſmall, much ground will be loſt in walks; and as the quarters ſhould be ſurrounded with eſpalier fruit-trees, the plants will draw up ſlender for want of a more open expoſure: the width of the walks ſhould alſo be proportioned to the ſize of the ground; theſe in a ſmall garden need not be above ſix feet wide; but in a larger one, ten feet is not too much. On each ſide of the walks that are not next the walls, ſhould be a border, about three or four feet wide, between it and the eſpalier; theſe are uſeful for raiſing various ſorts of ſmall herbs, ſallads, &c. which do not root too deep in the ground.

The quarters ſhould not be ſown or planted with the ſame crop two years together; but the crops ſhould be annually changed, or oftener, according to their time of duration. One of the beſt ſheltered quarters (which ſhould be as near the ſtables as can be admitted) ſhould be appropriated for the hot-beds, or raiſing early melons, cucumbers, &c. and to theſe there ſhould be a paſſage from the ſtables, for the conveniency of wheeling or carting dung, for the above purpoſes.

Water is abſolutely neceſſary in a kitchen-garden; for, without its aid, numbers of culinary plants would periſh in hot dry ſeaſons; therefore, thoſe who lay out a kitchen-garden, would do well to conſider this important article. The principal point of the general culture conſiſts in well digging and manuring the ſoil, which, if of a ſtrong nature, ſhould be meliorated with ſand, horſe-dung, aſhes, rotten wood, and ſuch light ſubſtances; but if it is light or ſandy, then the dung of hogs, cows, loam, &c. is the beſt manure for it.

KNAVE, in old law books, an appellation given to a man ſervant, or even to a male child.

KNEE, *Genu*, in anatomy, the articulation of the thigh and leg-bones.

The two principal motions of this joint are flexion and extenſion: in the former of theſe the leg may be brought to a very acute angle with the thigh, by the condyles of the thigh-bone being round and ſmoothed ſo far backwards; and in performing this, the patella is pulled down by the tibia. When the leg is to be extended, the patella is drawn upwards, and the tibia forwards, by the extenſor-muſcles, which, by means of the protuberant joint, and this thick bone with its ligament, have the chord with which they act, at a conſiderable angle, and therefore act with advantage; but, in order that the body may be ſupported by a firm perpendicular column, they are reſtrained by the poſterior croſs ligament, from pulling the leg further than to a ſtraight line with the thigh; and when this is done, the thigh and leg are almoſt as immoveable as if they were one continued bone: but when the joint is a little bent, the poſterior ligament is relaxed, and the patella not tightly braced; therefore the ſuperficial cavities of the tibia will allow this bone to be moved a little to either ſide, or with a ſmall rotation; which is done by the motion of the external cavity backwards and forwards on the internal, which ſerves as a kind of axis. The rotation of the leg outwards is of great advantage to us in croſſing our legs on ſeveral neceſſary occaſions; though it is wiſely ordered by Providence, that this motion ſhould not be very great, ſince this would have occaſioned frequent luxations. While all theſe motions are performing, the only part of the tibia that moves immediately on the condyles, is only ſo much as is within the cartilaginous rings, which by the thickneſs of their outſides make the cavities of the tibia more horizontal, by raiſing their external ſide, where the ſurface of the tibia ſlants downwards; by which means the motions of this joint are more equal and ſteady than they would otherwiſe have been. The cartilages are fitted to do this good office in the different motions and poſtures of the member, by being capable of changing a little their ſituation; and this alſo contributes to make the motions larger and quicker.

KNEE *of the Head*, in ſhip-building, a large piece of timber fayed and bolted to the ſtem, on which the figure or image of the head reſts: by reaſon of its great breadth at the upper part, it is compoſed of ſeveral pieces: it is let into the head, and faſtened to the ſhip's bows on each ſide by knees, which are called the cheeks of the head: it is alſo ſcarfed to the head of the fore-foot, and faſtened to the ſtem by a knee, called a ſtandard, in the form of a K. This is commonly called cut-water by ſeamen.

KNEES, in ſhip-building, certain crooked pieces of timber, one leg or arm of which is bolted to the beams, and the other to the ſhip's ſide. They are either lodging or hanging: the hanging knees are fayed up and down; and the other fore and aft on the inſide of the ſhip, reſting upon clamps.

KNIGHT, a perſon who, on account of ſome martial feat or notable action, is by the king raiſed to a rank above a gentleman. Knights were originally ſaid to be adopted, now we call it dubbed, as being ſuppoſed, in ſome meaſure, the ſons of him who knighted them.

The principal ceremonies at the creation of a knight were a box on the ear, a ſtroke with a ſword on the ſhoulder, putting on a ſhoulder-belt, gilt ſword, ſpurs, &c. after which, being properly armed, he was ſolemnly led to the church.

Camden deſcribes the manner of making knights bachelors, which is the loweſt, though the moſt ancient order of knighthood in England; the perſon kneeling was gently ſtruck on the ſhoulder and accoſted by the prince in theſe words, 'Riſe, and be a knight in the name of God.'

KNIGHT alſo denotes a perſon admitted into any order, with certain marks of diſtinction, as the knights of the Garter, of the Elephant, of the Holy Ghoſt, of Malta, &c.

KNIGHTS *of the Shire*, or KNIGHTS *of Parliament*, in the Britiſh polity, are two knights or gentlemen of eſtate, who are elected, on the king's writ, by the freeholders of every county, to repreſent them in parliament.

The qualifications of a knight of the ſhire, is to be poſſeſſed of 600 l. per ann. in a freehold eſtate. Their expences during their ſitting were, by a ſtatute of Henry VIII. to be defrayed by the county; but this is now ſcarce ever required.

KNIGHT-MARSHAL, an officer in the king's houſehold, who has juriſdiction and cognizance of any tranſgreſſion within the king's houſhold and verge; as alſo of contracts made there, whereof one of the houſe is party.

KNIGHT-HEADS, in ſhip-building, two ſtrong pieces of timber placed on each ſide of the deck of a merchant ſhip. They are uſed to ſupport the windlaſs, or roller, by which the cable is wound into the ſhip; and as each of them is formed of two pieces, they can be occaſionally taken down and ſeparated, to remove the cable from off the windlaſs, which reſts upon and turns round in the knight-heads; they are otherwiſe called bits, and in this ſenſe the upper part only is called the knight-head.

KNOTS *of the Log-Line*, the diviſions on the log-line. See the article LOG-*Line*.

KNOTTING, among ſailors, untwiſting the ends of a rope, and interweaving them curiouſly amongſt each other, ſo as to form knots of various ſhapes; amongſt which they number the diamond-knot, the wall-knot or walnut, the roſe-knot, bow-line-knot, double diamond-knot, &c.

KNOWLEDGE, according to Mr. Locke, conſiſts in the perception of the connection and agreement, or diſagreement and repugnancy of our ideas: and ſo it ſtands contradiſtinguiſhed from ignorance.

The whole ſtock of our knowledge conſiſts of four heads, namely, identity or diverſity, relation, co-exiſtence, and real exiſtence.

As to the identity or diverſity of our ideas, it is the firſt act of the mind to perceive its own ideas, and, ſo far as it perceives them, to know what each is, and thereby find out their difference.

The next kind of agreement or diſagreement in our ideas,

ideas, is co-exiſtence or non-co-exiſtence in the ſame ſubject, and this belongs particularly to ſubſtances.

The fourth ſort is that of actual exiſtence, agreeing to any idea. The mind becomes poſſeſſed of truth ſeveral ways, which conſtitute ſo many different ſpecies of knowledge. Thus, when the mind has a preſent view of the agreement or diſagreement of any of its ideas, or relation they bear to one another, this is called actual knowledge.

Secondly, a man is ſaid to know a propoſition, when having once evidently perceived the agreement or diſagreement of the ideas of which it conſiſts, and ſo lodged in his memory, the mind aſſents to it without any heſitation whenever it comes to be again reflected upon; and this may be called habitual knowledge.

KOLLOW, the name of a black earth found in various parts of the kingdom.

KORAN, or ALCORAN. See ALCORAN.

KOS, in Jewiſh antiquity, a meaſure of capacity, containing about four cubick inches: this was the cup of bleſſing, out of which they drank when they gave thanks after ſolemn meals, like that of the paſſover.

KUTUCHTA, among the Calmuck-Tartars, the name of their high prieſt, or ſovereign pontiff, formerly only the deputy of the delai-lama, or high prieſt of the Tartars, but at preſent independent on him.

L.

L, A ſemi-vowel, or liquid, making the eleventh letter of the alphabet.

It was derived from the old Hebrew Lamed, or Greek Lambda λ. It is ſounded by intercepting the breath between the top of the tongue and forepart of the palate, with the mouth open, and makes a ſweet ſound, with ſomething of an aſpiration; and therefore the Britons and Spaniards uſually doubled it, or added an *h* to it in the beginning of words, as in *llan*, or *lhan*, a temple, ſounding nearly like *fl*, &c. In Engliſh words of one ſyllable it is doubled at the end, as *tell*, *bell*, *knell*, &c. but in words of more ſyllables than one it is ſingle at the end, as *evil*, *general*, *conſtitutional*, &c. It is placed after moſt of the conſonants in the beginning of words and ſyllables, as *black*, *glare*, *ad-le*, *ea-gle*, &c. but before none. Its ſound is clear in *Abel*, but obſcure in *able*, &c.

L, among the ancients, was a numeral letter, and is ſtill ſo in the Roman cyphering, and denotes 50, according to the verſe,

Quinquies L denos numero deſignat habendos.

being half a C, which ſignifies a hundred, and was formerly written thus E. When a line was added at top L̄, it ſtood for 50,000.

L A, in muſick, the ſyllable by which Guido denoted the laſt ſound of each hexachord; if it begins in C, it anſwers to our A; if in G, to E; and if in F, to D.

LABARUM, in Roman antiquity, the ſtandard borne before the Roman emperors, being a rich purple ſtreamer, ſupported by a ſpear.

LABDANUM, or LABANUM, in pharmacy, a reſin of the ſofter kind, though too firm in its conſiſtence to be ranked among the fluid ones.

There are two kinds of labdanums in the ſhops, the one in cakes and maſſes of an irregular figure, the other twiſted up into a ſort of oblong rolls. The former is much the beſt, but not eaſy to be met with. It is of a dark colour, approaching to blackiſh, conſiderably heavy, of a tough conſiſtence, of a ſtrong and not unpleaſant ſmell, and of an aromatick, but not very agreeable taſte.

The ſhrub which produces it is one of the polyandria monogynia of Linnæus, and one of the herbæ pentapetalæ foliis in caule ex adverſo binis of Ray. It is a low ſhrub, of the ciſtus kind, ſpreading itſelf on the ground, and rarely riſing to more than two feet high. The labdanum is collected in the following manner: they take a kind of wooden rake, but without teeth, and to this they fix a number of long thongs of untanned leather. With this inſtrument they collect the labdanum, during the heat of the day, by drawing it ſeveral times over the ſhrubs. They afterwards ſcrape off the reſin from theſe thongs, and put it up for uſe. The propereſt ſeaſon for this buſineſs is in the dog-days, in the ſereneſt weather, and when there is no wind.

Labdanum is uſed externally, to attenuate and diſcuſs tumours; internally it is rarely uſed, though it is greatly extolled by ſome againſt catarrhs, and in dyſenteries.

LABEL, a long thin braſs ruler, with a ſmall ſight at one end, and a centre-hole at the other; commonly uſed with a tangent line on the edge of a circumferentor, to take altitudes, &c.

LABEL, in law, a narrow ſlip of parchment, &c. affixed to a deed to hold the ſeal. It alſo denotes any paper annexed by way of addition or explication to a latter will, which is otherwiſe called a codicil.

LABEL, in heraldry, a fillet uſually placed in the middle and along the chief of the coat, without touching its extremities, adorned with pendants, and the ninth part of the chief in breadth. It particularly diſtinguiſhes a ſecond brother from the eldeſt.

LABIAL, in grammar, denotes ſuch letters as are chiefly pronounced by the motion of the lips; and ſo ſtand contradiſtinguiſhed from palatal, dental, guttural, &c.

LABIATE *Flowers*, in botany, ſuch irregular monopetalous flowers as, for the moſt part, are divided into two lips; the upper is called the creſt, the under the beard. In ſome ſpecies the upper lip is turned upwards, as in ground-ivy; but moſt uſually it is convex above, and with the lower lip repreſents a kind of helmet or monk's hood, hence called galeate, cucullate, and galericulate flowers; in which form are moſt of the verticillate plants.

LABORATORY, or ELABORATORY, the chymiſt's workhouſe, or the place where they perform their operations; where the furnaces are built, their veſſels kept, &c. and in general, the term laboratory is applied to any place where phyſical experiments in pharmacy, chymiſtry, pyrotechny, &c. are performed. See FURNACE, &c. See CHYMICAL *Laboratory*, or *Elaboratory*.

LABYRINTH, in anatomy, the internal cavity of the ear, ſo called from ſinuoſities and windings. See EAR.

LABYRINTH, in gardening, a winding mazy walk between hedges, through a wood or wilderneſs. The chief aim is to make the walks ſo perplexed and intricate, that a perſon may loſe himſelf in them, and meet with as great a number of diſappointments as poſſible. They are rarely to be met with, except in great and noble gardens, as Verſailles, Hampton-court, &c.

There are two ways of making them; the firſt is with ſingle hedges: this method has been practiſed in England: and theſe may, indeed, be beſt, where there is but a ſmall ſpot of ground allowed for making them; but where there is ground enough, the double is moſt eligible. Thoſe made with double hedges, with a conſiderable thickneſs of wood between them, are approved as much better than ſingle ones: this is the manner of making them in France and other places; of all which that of Verſailles is allowed to be the nobleſt of its kind in the world. It is an error to make them too narrow; for that makes it neceſſary to keep the hedges cloſe clipt: but if, according to the foreign practice, they are made wide, they will not ſtand in need of it. The walks are made with gravel uſually ſet with hornbeam: the paliſades ought to be 10, 12, or 14 feet high: the hornbeam ſhould be kept cut, and the walks rolled.

LAC, MILK, among phyſicians, &c. See MILK.

The appellation lac is alſo given to ſeveral chymical preparations, as, 1. Lac ammoniaci, which is ordered by the college to be made in the following manner: take of gum ammoniack, two drams; of ſimple penny-royal water, half a pint; and rub the gum in a mortar with the water, till it is diſſolved, which it will do without heat. 2. Lac ſulphuris, called alſo precipitated ſulphur. See SULPHUR.

LACK LUNÆ, in natural hiſtory, a name ſometimes given to mineral agarick.

LACCA, in natural hiſtory, &c. a vegetable production, improperly called a gum, as being inflammable, and not ſoluble in water.

There are three kinds of lacca kept in the ſhops, which are all the products of a ſpecies of ziziphus

The ſtick-lacca is a hard, reſinous, and friable ſubſtance, of an uneven and granulated ſurface, and of a roundiſh but ſomewhat duſky colour. It is of an auſtere and ſubaſtringent taſte, and is fixed round certain ſticks, and branches of a woody ſubſtance. The ſeed-lacca is brought to us in looſe grains, or little maſſes, of a roundiſh irregular figure, and of a rediſh colour, which ſeem no way different from the ſtick-lacca, but as parts from the whole. The third kind, or ſhell-lacca, is met with in thin and tranſparent cakes, made by melting the above granules, or what is taken from the ſticks, into a maſs. Some affirm that it exſudes from the jujube, and ſeveral other trees of the ſame genus; but others aſſert that it is no vegetable exſudation at all, but a ſubſtance analogous to wax laid on theſe branches by inſects. Till we have ſome very good obſerver on the ſpot, to determine between the poſitive aſſertions of the ſeveral authors who have wrote upon it, we muſt be contented to reſt in uncertainty: but whatever may be the hiſtory of this drug, its virtues are leſs in diſpute; it is an attenuant, aperient, and diuretick, and is ſometimes preſcribed in diſorders of the liver and ſpleen, and in jaundices and dropſies. It would probably be in more uſe, if we knew how to open its body, ſo as to make it exert its virtues; for it is a ſort of unchangeable medicine which paſſes the body very little altered, if given in ſubſtance; and it is of the number of thoſe things from which a tincture is very difficultly extracted. But beſides theſe virtues, a beautiful red colour is prepared from it by only boiling ſtick-lacca in water, and then filtrating the decoction, and evaporating the ſuperfluous humidity. This lacca is of great uſe in painting, on which account its name has been given to ſeveral colours procured from other ingredients in much the ſame manner.

Artificial LACCA, or LAKE, in painting, a white earthy body, as cuttle-fiſh bone, the baſis of alum, or chalk, tinged with ſome crimſon vegetable dye, ſuch as is obtained from cochineal or Braſil-wood, diſſolved or taken up by means of ſome alkaline ſalt, and precipitated on the earth by the addition of ſome acid.

Lake is uſed in all kinds of painting, except enamel; but particularly in oil, where it ſupplies the place of carmine. It is valuable both for its brightneſs and crimſon teint; which make it uſeful for carnations to the portrait painters; for ſkies to the landſcape or ſhip painters; and for flowers to thoſe who paint ſtill life. Its tranſparency in oil renders it alſo of great ſervice in glazing, as it is called, over vermilion; and in painting ſcarlet draperies, and the red parts of the lips; and its acquiring a dark hue, by this tranſparency, when uſed without the addition of any opaque pigment, which gives it an unrivalled excellence in the ſhades of red draperies, or other ſimilar caſes. Notwithſtanding theſe qualities, lake is not at preſent univerſally approved; nor without reaſon; for there is a defect which makes it to be frequently rejected, where its uſe can be avoided. This defect is the uncertainty of its ſtanding, when prepared in that manner which moſt conduces to its perfection in other reſpects: for though ſome parcels will hold their colour entirely well, yet others prepared in the ſame manner, as far as art can aſſure it, will fly in a degree that makes the uſe of it deſtructive to any painting: and if this defect be effectually remedied, as it may be by ſecuring the tinging particles by gums, from all attacks of the air; yet this is generally at the expence of the brightneſs and tranſparency; the earth, which is the baſis of the pigment, being locked up by the gums, and rendered incapable of being combined intimately with, or imbibing the oil. Beſides the perfections of lake, which it may have in common with other colours, there is yet another that relates only to itſelf, which is the inclining to the ſcarlet hue, that makes it more valuable for almoſt all the purpoſes to which it is applied; and where this quality, joined to the others, happens to be found in it, there is ſcarcely any limits to be ſet on its value with eminent painters of any kind.

Lake was moſt probably firſt made from the colour found in the grains of the ſtick-lack, from whence it ſeems to have taken its name; but it may be made from a great variety of ſubſtances which afford a crimſon tinge; though at preſent it is ſeldom prepared from any other than cochineal, ſcarlet rags, and Braſil-wood.

The beſt of what is commonly ſold is made from the colour extracted from ſcarlet rags, and depoſited on the cuttle-bone, which may be done in the following manner:

"Take a pound of the beſt pearl-aſhes, and having diſſolved them in two quarts of water, purify them by filtering through paper. Add then to this ſolution two more quarts of water; and having put in a pound of ſcarlet ſhreds, procured from the taylors, for they muſt be entirely clean, boil them in a pewter boiler made for that purpoſe, till the ſhreds appear to have wholly loſt their ſcarlet colour. Take them out of the ſolution, and preſs them well; dipping them after in water, and preſſing them again, that all the fluid they had imbibed may be got from them, which muſt be put back to the reſt. Take then another pound of the ſhreds, and repeat the like treatment of them in the ſame ſolution; as alſo a third and fourth pound. While this is doing, diſſolve a pound and half of cuttle-fiſh in a pound of ſtrong aqua-fortis, in a glaſs receiver, adding more of the bone, if it appear to produce any ebullition in the aqua-fortis; and having ſtrained off this ſolution through flannel, pour it into the other by degrees; obſerving whether it produce any effervеſcence on putting in the laſt quantity; which if it do in any great degree, more of the cuttle-fiſh bone muſt be diſſolved in aqua-fortis; and the ſolution very gradually added, till no ebullition appear to be raiſed by it in the mixture. If this be properly managed, the fluid will ſoon become clear and colourleſs, and the tinging particles extracted from the ſhreds, together with the cuttle-fiſh bone, will ſubſide to the bottom, and form a crimſon ſediment, which is the lake. The water muſt then be poured off; and two gallons of hard ſpring-water muſt be put to the lake, and well ſtirred about to mix them; which, being likewiſe poured off, after the lake has again ſettled to the bottom, muſt be replaced by another two gallons; and the ſame method muſt be repeated four or five times; but if hard water cannot be procured, or the lake appear too purple, half an ounce of alum ſhould be added to each quantity of water before it be uſed. When the lake is thus ſufficiently freed from the ſalts, it muſt have the water drained from it in a filter, covered with a linen cloth, which has been ſo worn as to have no knap or down remaining on its ſurface. After the lake has drawn to a proper dryneſs, it muſt be dropped, on clean boards, by means of ſticks of elder, mountain-aſh, or other hollow wood, cut into the form of pens, and ſuffered to dry; when the drops will appear in the form of little cones or pyramids."

Orange LAKE. This lake is the tinging part of annatto precipitated together with earth of alum. It is of a very bright orange colour, and would work well with either oil or water, but cannot be depended upon, when uſed either of thoſe ways, for ſtanding long. It is, however, a very fine colour for varniſh painting, where the fear of flying is out of queſtion; and is alſo of an admirable good effect for putting under cryſtal for the imitation of the vinegar garnet; for which purpoſe it has been uſed with great ſucceſs.

The manner of preparing this lake is as follows:

"Take of the beſt annatto four ounces, and of pearl-aſhes one pound. Put them together into a gallon of water, and boil them half an hour; and then ſtrain the ſolution through paper. Make, in the mean time, a ſolution of a pound and a half of alum, in another gallon of water; and mix it gradually with the ſolution of the pearl-aſhes and annatto; obſerving to ceaſe any further addition when the fluid becomes colourleſs, and no further ebullition enſues on the commixture. Treat the ſediment or precipitated matter in the ſame manner as has

has been before directed for other kinds of lake. In the fame manner may a red lake be made from madder, brazil, &c. But where the colour of the fubject depends upon a very fubtile texture or arrangement of the parts, this method deftroys, or at leaft impairs the colour, as in violets, red rofes, &c. So that it feems applicable only to the tinging vegetables of a fomewhat ftrong and firm texture."

A red lake may be obtained barely by boiling ftick-lack in water, then filtring the decoction and evaporating the fuperfluous humidity: for the beautiful red colour adheres to the outfide of the fticks broken off the trees, along with the lacca, and readily communicates itfelf to boiling water.

LACHRYMAL Gland, in anatomy. See Eye.

Fiftula Lachrymalis, in phyfick. See Fistula.

Sacculus Lachrymalis, or *Puncta* Lachrymalia. See Eye.

LACHRYMATORIES, in antiquity, fmall glafs or earthen veffels wherein the tears of the friends were repofited and buried with the afhes of the dead.

LACONISM, a pithy fententious fpeech in the manner of the Lacedæmonians, who were remarkable for the concifenefs of their way of delivering themfelves.

LACTATION, the act of giving fuck.

LACTEALS, *Vafa Lactea*, in anatomy, long flender tubes for the conveyance of the chyle from the inteftines to the common refervatory. See Chyle.

LACTARY Column. See Column.

LACTIFEROUS Plants, in botany, fuch plants as abound with a milky juice, as the tithymalus, fonchus, and lettuce.

LACUNÆ, in anatomy, certain excretory ducts in the vagina; and fometimes the glands or excretory ducts in the urethra are fo denominated.

LACUNAR, in architecture, an arched roof or cieling, particularly the flooring over porticos or piazzas.

LAGOECIA, round-headed cummin, in botany, a genus of plants, the flower of which confifts of five petals, very fhort, and bicornate: there is no pericarpium, the feed, which is fingle, being contained in the cup. This plant has neither the fmell, appearance, or tafte of cummin; its fmell being more like that of the carrot.

LAGOPHTHALMIA, in furgery, an everfion and gaping of the eye-lids, otherwife called ectropium. See Ectropium.

LAIR, among fportfmen, the place where the deer harbour by day. This term is alfo ufed to fignify a place where cattle ufually reft under fome fhelter: by which means the ground generally becomes enriched with their dung.

LAKE, a collection of waters contained in fome cavity in an inland place, of a large extent, furrounded with land, and having no communication with the ocean.

Lakes may be divided into four kinds. 1. Such as neither receive nor fend forth rivers. 2. Such as emit rivers, without receiving any. 3. Such as receive rivers, without emitting any. And, 4. Such as both receive and fend forth rivers.

Of the firft kind, fome are temporary, and others perennial: moft of thofe that are temporary owe their origin to the rain, and the cavity or depreffion of the place in which they are lodged: thus in India there are feveral fuch lakes made by the induftry of the natives, of which fome are a mile, and fome two in circuit; thefe are furrounded with a ftone wall, and being filled in the rainy months, fupply the inhabitants in dry feafons, who live at a great diftance from fprings or rivers. There are alfo feveral of this kind formed by the inundations of the Nile and the Niger; and in Mufcovy, Finland, and Lapland, there are many lakes formed partly by the rains and partly by the melting of the ice and fnow; but moft of the perennial lakes, which neither receive nor emit rivers, probably owe their rife to fprings at the bottom, by which they are conftantly fupplied.

The fecond kind of lakes, which emit, without receiving rivers, is very numerous. Many rivers flow from thefe as out of cifterns; where thefe fprings being fituated low within a hollow place, firft fill the cavity, and make it a lake, which not being capacious enough to hold all the water, it overflows and forms a river: of this kind is the Wolga, at the head of the river Wolga; the lake Odium, at the head of the Tanais; the Adach, from whence one branch of the river Tigris flows, the Ozero, or white lake in Mufcovy, is the fource of the river Shackfna. The great lake Chaamay, which emits four very large rivers, which water the countries of Siam, Pegu, &c. viz. the Menau, the Afa, the Caipoumo, and the Laquia, &c.

The third fpecies of lakes, which receive rivers, but emit none, apparently owe their origin to thefe rivers, which in their progrefs from their fource, falling into fome extenfive cavity, are collected together; and form a lake of fuch dimenfions, as may lofe much by exhalation, as it continually receives from their fources: of this kind is that great lake improperly called the Cafpian fea; the lake Afphaltes, alfo called the Dead Sea; the lake of Geneva, and feveral others.

Of the fourth fpecies, which both receive and emit rivers, we reckon three kinds, as the quantity they emit is greater, equal, or lefs than they receive. If it be greater, it is plain that they muft be fupplied by fprings at the bottom; if lefs, the furplus of the water is probably fpent in exhalation: and if it be equal, their fprings juft fupply what is evaporated by the fun.

Lakes are alfo divided into thofe of frefh water, and thofe of falt. Dr. Halley is of opinion, that all great perennial lakes are faline, either in a greater or lefs degree; and that this faltnefs encreafes with time: and on this foundation he propofes a method for determining the age of the world.

Large lakes anfwer the moft valuable purpofes in the northern regions, the warm vapours that arife from them moderating the pinching cold of thofe climates; and what is ftill a greater advantage, when they are placed in warmer climates at a great diftance from the fea, the exhalations raifed from them by the fun, caufe the countries that border upon them to be refrefhed with frequent fhowers, and confequently prevent their being barren defarts.

LAMA, the fovereign pontiff, or rather god, of the Afiatick Tartars, inhabiting the country of Barantola. The lama is not only adored by the inhabitants of the country, but alfo by the kings of Tartary, who fend him rich prefents, and go in pilgrimage to pay him adoration, calling him lama congiu, i. e. god the everlafting father of heaven. He is never to be feen but in a fecret place of his palace, amidft a great number of lamps, fitting crofs-legged upon a cufhion, and adorned all over with gold and precious ftones; where, at a diftance, they proftrate themfelves before him, it not being lawful for any to kifs even his feet. He is called the great lama, or lama of lamas, that is, prieft of priefts. And to perfuade the people that he is immortal, the inferior priefts, when he dies, fubftitute another in his ftead, and fo continue the cheat from generation to generation. Thefe priefts perfuade the people, that the lama was raifed from death many 100 years ago; that he has lived ever fince, and will continue to live for ever.

LAMB, in zoology, the young of the fheep-kind. See Sheep. A male lamb of the firft year is called a wedder-hog, and the female an ewe-hog; the fecond year it is called a wedder, and the female a fheave. If a lamb be fick, mare's milk with water may be given it; and by blowing into the mouth, many have been recovered after appearing dead. The beft feafon for weaning them is when they are 16 or 18 weeks old; and about Michaelmas, the males fhould be feparated from the females, and fuch males as are not defigned for rams, gelded.

LAMBOIDES, in anatomy, one of the futures of the fkull.

LAMELLÆ, in natural hiftory, denotes very thin plates, fuch as the fcales of fifh are compofed of.

LAMENTATIONS, a canonical book of the Old Teftament, written by the prophet Jeremiah. The two firft chapters of this book are employed in defcribing the calamities of the fiege of Jerufalem. In the third, the author deplores the perfecutions he himfelf had fuffered. The fourth turns upon the defolation of the city and the misfortune of Zedekiah. The fifth chapter is a prayer for the Jews in their difperfion and captivity; and at the end of all, he fpeaks of the cruelty of the Edomites,

Edomites, who had insulted Jerusalem in her misery. The four first chapters of the Lamentations are an abecedary, every verse or couplet beginning with one of the letters of the Hebrew alphabet, in the alphabetical order.

The subject is of the most moving kind, and the stile throughout lively, pathetick, and affecting. "Did we ever find, says Dr. South, sorrow flowing forth in such a natural prevailing pathos, as in the Lamentations of Jeremy? One would think that every letter was wrote with a tear; that every word was the noise of a breaking heart; that the author was a man compacted of sorrows, disciplined to grief from his infancy; one who never breathed but in sighs, nor spoke but in a groan."

LAMINÆ, in physiology, the thin plates whereof many substances consist.

LAMIODONTES, in natural history, the same with the glossopetra. See GLOSSOPETRA.

LAMIUM, dead nettle, in botany, a genus of the didynamia gymnospermia, class of plants, the flower of which consists of one labiated and ringent petal: the seeds are four, triangular, and contained in the bottom of the cup. The flowers of this plant are said to be good in the fluor albus, dysentery, and scrophulous disorders. The herb is aperient, emollient, and vulnerary.

LAMMAS-DAY, a festival celebrated on the first of August by the Romish church, in memory of St. Peter's imprisonment.

LAMP, λαμπας, a vessel containing oil, with a lighted wick. See OIL, FLAME, FIRE, &c.

Dr. St. Clair, in Phil. Transf. No. 245, gives the description of an improvement upon the common lamp. He proposes that it should be made two or three inches deep, with a pipe coming from the bottom almost as high as the top of the vessel: let it be filled so high with water as to cover the hole of the pipe at bottom, that the oil may not get in at the pipe, and so be lost. Then let the oil be poured in, so as to fill the vessel almost brim full, which must have a cover pierced with as many holes as there are wicks designed. When the vessel is thus filled, and the wicks are lighted, if water falls in by drops at the pipe, it will always keep the oil at the same height, or very near; the weight of water being to that of the oil as 20 $\frac{8}{1}$ to 19, which in two or three inches makes no great difference. If the water runs faster than the oil wastes, it will only run over at the top of the pipe, and what does not run over will come under the oil, and keep it at the same height. See ENAMILLING *by the Lamp*.

LANCET, a chirurgical instrument, sharp-pointed, and two edged, chiefly used for opening the veins in the operations of phlebotomy, or bleeding; also for laying open abscesses, tumours, &c. A surgeon should never be without some of these, of different sizes.

LAND, in a limited sense, denotes arable ground. It is also used for meadow-ground, pasture, wood, commons, &c. See MEADOW, PASTURE, &c.

LAND, in the sea-language, makes part of several compound terms: thus *Land-laid*, or to lay the land, is just to lose sight of it. *Land-locked*, is when land lies all round the ship, so that no point of the compass is open to the sea: if she is at anchor in such a place, she is said to ride land-locked, and is therefore concluded to ride safe from the violence of winds and tides. *Land-mark*, any mountain, rock, steeple, tree, &c. that may serve to make the land known at sea. *Land is shut in*, a term used to signify that another point of land hinders the sight of that the ship came from. *Land-to*, or the ship lies land to; that is, she is so far from shore that it can only be just discerned. *Land-turn*, is a wind that in almost all hot countries blows at certain times from the shore in the night. *To set the Land*, that is, to see by the compass how it bears.

LANDGRAVE, the German name for a count or earl, that has the government of a province, country, or large tract of land.

LANDGRAVIATE, or LANDGRAVATE, the office, authority, jurisdiction, or territory of a landgrave.

LANDSKIP, or LANDSCAPE, in painting, the view or prospect of a country, extended as far as the eye will reach.

In painting landskips, the following rules will be found of use: 1. Always express a fair horizon, shewing the heavens cloudy or clear, more or less, according to the occasion; and if the sun is expressed at all, let it be either at rising or setting, and as it were behind or over some hill. The moon and stars are seldom or never depicted, unless in twilight pieces, because all things are supposed to be seen by day. 2. Observe to make the sun's light reflect upon all the objects the same way, and the shadows to fall the contrary way. 3. Take care to augment or lessen things proportionally, as they are supposed to be nearer or further from the eye. 4. In expressing things at large distances, as 10, 20, or 30 miles off, where the object is scarce to be discerned; as whether it be temple, castle, house, or the like, shew no particular signs thereof, as any eminent distinction, but rather as weakly, faintly, and confusedly, as the eye judges of it. 5. If landskips be laid in colours, the further you go, the more you must lighten it with a thin and airy blue, to make it seem as it were afar off, beginning at first with a dark green, so driving it by degrees into a blue, according to the distance. 6. Make your landskip to shoot, as it were, one part lower than another, making the nearest place or hill highest, and those that are further off to shoot away under that, that the landskip may appear to be taken from the top of an hill. 7. Let every thing have its proper motion, as in trees when they are shaken with the wind, making the smaller boughs yielding, the stiffer less bending; in clouds, that they follow the winds; in rivers, the general current, and flashing of the waters against the boat sides. 8. In the sea, the waves and other proper agitations, the rolling of the billows, the tumbling of vessels up and down, the ships floating, some dipt, some half drowned, some standing almost an end, some hid almost with the waves, by means of the uncertainty of the surges, others endeavouring to live. 9. In the motion of the waters falling from an high place, but especially when they fall upon rocks and stones, you must represent it leaping up into the air, and sprinkling all about; lastly, let every thing that moves, whether essentially or accidentally, have its proper representation. 10. Let the work imitate the season it is intended to represent; as if you intend it for a winter-piece, represent felling of woods, sliding upon the ice, fowling by night, hunting of bears or foxes in the snow, making the trees every where naked, or laden with snow or a hoar-frost; the earth bare, without greenness, flowers, or cattle; the air thick or heavy; the water frozen, with carts passing over it, and boys playing upon it, &c. 11. Lastly, let every site have its proper parerga, adjuncts or additional graces, as the farm-house, wind-mill, water-mill, woods, flocks of sheep, herds of cattle, pilgrims, ruins of temples, castles, and monuments, with a thousand such other things, only proper to particular subjects.

LANGREL SHOT, at sea, that consisting of two bars of iron, joined by a chain or shackle, and having half a ball of iron fixed on each end, by means of which apparatus, it does great execution among the enemy's rigging.

LANGUAGE, a set of words which any people have agreed upon, whereby to communicate their thoughts to each other. Buffier observes, that the first principles of all languages may be reduced to expressions, signifying, first, the subject spoken of; secondly, the thing affirmed of it; and thirdly, the circumstances of the one and the other: but as each language has its peculiar ways of denoting each of these, a language is only to be looked on as an assemblage of expressions, which chance or caprice has established among a certain people. Hence we find, that it is usage and custom that are the rules of a language; and these hold their empire independent of reason, or any other cause: nor has reason any thing to do in language, unless to study or teach it such as it is: here then commences grammar, a just plan of which supposes a language already introduced by use, and without pretending to alter or amend a tittle, only furnishes reflections called rules, to which the manners of speaking used in that language may be reduced: this assemblage of reflections is what we call the grammar of that language. See GRAMMAR and WORD.

It is chance then to which we owe usage, and usage that makes the rules and measures of a language. Usage indeed is somewhat dubious, and may be divided into good and bad: the difference between the two being this, that the former is better established or authorized than the latter; and the difference of authority is no more, in the

the dead languages, than the writings of the best authors in that language; those being allowed the best authors in the language, who wrote when the state was in its greatest glory. Thus the age of Augustus being the most distinguished period in the Roman history, we call that good Latin which is conformable to the manners of speaking used by authors who wrote within 50 years before, or after the reign of that emperor. As to the living languages, the good usage, or mode, is that which obtains amongst the most eminent persons, whether as to quality and authority, or as to learning, and the reputation of writing well.

There is found a constant resemblance between the genius of each people, and the language they speak. Thus the Greeks, a polite but voluptuous people, had a language perfectly suitable, full of delicacy and sweetness. The Romans, who seemed only born to command, had a language noble, nervous, and august; and their descendants, the Italians, are sunk into softness and effeminacy, which is as easily perceivable in their language, as in their manners. The language of the Spaniards is full of that haughtiness which constitutes the distinguishing character of the people. The French, who have a world of vivacity, have a language that runs extremely brisk and lively. And the English, who are naturally blunt, thoughtful, and of few words, have a language exceeding short, concise and sententious.

Languages are divided into, 1. Original or mother-tongues, as the Hebrew and Arabick in the east; Kircher adds the Cophtick; the Teutonick and Sclavonick in the west. And Du Jon maintains the Gothick to be the mother of the Teutonick tongues, namely, those spoken in the north; and some add the Biscayan or Bas Breton as the mother-tongue of the Celtæ or Gauls.

2. Derivative languages which are those formed out of a mixture of several others, as Latin, French, English, &c.

Learned or dead languages are those which only subsist in books, and which must be learned by the rules of grammar, as the Greek, Hebrew, Syriack, and Chaldee.

Living languages are those still spoken in some country or other, and which may be learned by conversation. The most popular among these are the French, Italian, Spanish, and English.

Speech is a privilege peculiar to man, and he is likewise furnished with organs proper for forming an articulate voice: hence it is easy to conceive men might form a settled and uniform language, by only affixing an idea to a word, and making others acquainted with it. And it is also easy to conceive, that the connexion betwixt most words and things being perfectly arbitrary, they may be changed at different places, at different times, and by different persons. And it is not very unlikely that variety of capacities and inclinations, the different occasions people have to express themselves, different turns of imagination, the ease people find in delivering themselves rather one way than another, the forgetting old words, the many new things met with requiring new names, strangers settling among natives, &c. it is not unlikely that these and many other causes should cause an alteration in living languages.

When all mankind inhabited the same country and kept up a commerce with each other, living through many ages, it is no great wonder that the common language was continued amongst them, without any considerable alterations, till after the flood; since Noah himself was born not long after Adam's death, and a great many antediluvians living in Noah's time might have conversed with Adam and Eve some hundred years. Since all the world was then destroyed, except Noah and his family, the tongue spoken by this patriarch must be the only remaining language, and which might be easily handed down to his posterity, as long as they dwelt in the same country. But when, before their parting, they attempted to build a city and tower, God confounded the language, insomuch that, not being able to understand each other, they were forced to separate, and leave the building unfinished.

LANGUED, in heraldry, is applied to such animals whose tongues appear out of their mouths, being of a different colour from that of the body.

LANGUOR, a faintness or relaxation of the members, owing either to a want or decay of spirits.

LANIGEROUS, among herbalists, trees that bear such a woolly or downy substance as is commonly contained in the katkins of the willow, &c. The word is derived from the Latin, *lana*, wool, and *gero*, to bear.

LANTERN, or LANTHORN, a well known invention for shewing light in the night.

Magick LANTERN, an optick machine, whereby little painted images are represented so much magnified, as to be accounted the effect of magick by the ignorant.

The contrivance is briefly this: ABCD (*plate* XLIV. *fig.* 1.) is a tin-lantern, from whose side there proceeds a square tube *b n k l m c*, consisting of two parts; the outermost of which *n k l m* slides over the other, so as that the whole tube may be lengthened or shortened by that means. In the end of the arm *n k l m*, is fixed a convex glass *k l*; about *d e*, there is a contrivance for admitting and placing an object, *d e*, painted in dilute and transparent colours, on a plane thin glass; which object is there to be placed inverted. This is usually some ludicrous or frightful representation, the more to divert the spectators: *b h c* is a deep convex glass, placed in the other end of the prominent tube, the only use of which is to cast the light of the flame *a* strongly on the picture *d e*, painted on the plane thin glass. Hence, if the object *d e* be placed further from the glass *k l* than its focus, it is manifest that the distinct image of the object will be projected by the glass *k l*, on the opposite white wall F H, at *f g*; and that in an erect posture: so that, in effect, this appearance of the magick lantern is the same with that of the camera obscura, or darkened room; since here the chamber EFGH is supposed quite dark, excepting the light in the lantern ABCD. See CAMERA OBSCURA.

And here we may observe, that if the tube *b n k l m c* be contracted, and thereby the glass *k l* brought nearer the object *d e*, the representation *f g* shall be projected so much the larger, and so much the more distant from the glass *k l*; so that the smallest picture at *d e* may be projected at *f g*, in any greater proportion required, within due limits: whence it is, that this lantern got the name of lanterna megalographica. On the other hand, protracting the tube will diminish the object.

LANTERN, in architecture, a little dome raised over the roof of a building, to give light, and serve as a crowning to the fabrick.

The term lantern is also used for a square cage of carpentry, placed over the ridge of a corridor, or gallery, between two rows of shops, to illumine them, like that of the Royal Exchange of London.

LANTERNISTS, a denomination assumed by the academicians of Tholouse.

LANUGO, the soft down of plants, like that growing on the fruit of the peach-tree; whence such plants are termed lanuginous.

LAPATHUM, the dock, in botany, a perennial plant bearing numerous imperfect flowers set in double cups; the outermost of which consists of three small green leaves, the inner of three larger redish ones, which become a covering to a glossy triangular seed.

LAPATHUM *acutum Folio plano*, sharp-pointed wild dock, with long, narrow, acuminated leaves, not curled about the edges, and the seed-covers indented and marked with little tubercles. The roots are of a brownish colour on the outside, and of a yellowish within, which grows deeper in drying.

The roots of the sharp-pointed dock, have a bitterish astringent taste, and no remarkable smell: the roots of the other common wild docks are nearly of the same quality, equally discover their astringent matter both to the taste and by striking an inky blackness with a solution of chalybeat vitriol, and have been often substituted in our markets for those of the sharp-pointed kind; which last are generally, and, so far as can be judged from their taste, justly accounted the most efficacious. They are supposed to have an aperient and laxative, as well as an astringent and corroborating virtue; approaching in this respect to rhubarb, but differing widely in degree, their stypticity being greater, and their purgative quality, if really they have any purgative quality, all far less. They stand recommended in habitual costiveness, obstructions of the viscera, scorbutick and cutaneous maladies; in which last intention, fomentations, cataplasms, or unguents of the roots have been commonly joined to their internal use: in many cases, the external appli-

application alone is ſaid to be ſufficient. A decoction of half an ounce, or an ounce, of the freſh roots, or of a dram or two of the dry roots, is commonly directed for a doſe.

Lapathum *Rhabarbarum monachorum*, monks rhubarb, garden patience, with large, broad, acuminated leaves; rediſh branched ſtalks; the leaves that cover the ſeeds unindented, and a tubercle on one of them: the root is of a yellow colour, with red veins, approaching in appearance to rhubarb.

This root is ſuppoſed to poſſeſs the virtues of rhubarb in an inferior degree. It is obviouſly more aſtringent than rhubarb, but comes very far ſhort of it in purgative virtue, though given, as uſually directed in double its doſe; nauſeating the ſtomach, without producing any conſiderable evacuation. It communicates a deep yellow tincture both to water and ſpirit.

LAPIDARY, an artificer who cuts precious ſtones. See Gem. The art of cutting precious ſtones is of great antiquity. The French, though they fell into it but lately, have notwithſtanding carried this art to a very great perfection, but not in any degree ſuperior to the Engliſh. There are various machines employed in the cutting of precious ſtones, according to their quality: the diamond, which is extremely hard, is cut on a wheel of ſoft ſteel, turned by a mill, with diamond duſt, tempered with olive-oil, which alſo ſerves to poliſh it.

Plate XLV. *fig.* 1. is a workman cutting the diamonds by rubbing two of theſe ſtones, firmly cemented to ſticks, againſt each other, while the duſt that falls from the ſtones during the operation is carefully received into an utenſil, called a cutting-box.

Fig. 2. is a workman ſtanding at the front of the mill, and touching the iron wheel, which they call a ſkeve, with diamond duſt, mixed up with olive-oil, by means of a gooſe-quill cut almoſt in the ſhape of a writing pen. The workmen call it a ſtriking-pen.

Fig. 3. is a labourer turning the mill, which is done by moving backwards and forwards an inſtrument of wood, which they call a gate. This alternate motion turns the large wheels, by means of an iron-arm, which they call a ſword; one end of which is faſtened to the gate, and the other to a crank or elbow in the ſpindle of the wheel. The large wheels being thus put in motion by means of the gate, the diamond-mill is turned by chords or ſtrings going round the circumference of theſe wheels, and the fuſees on the ſpindles of the mill.

Plate XLIV. *fig.* 2. The cutting-box on a large ſcale. B, B, B, the cutting-box. C, C, cutting-ſticks, with diamonds cemented to their extremities. This figure repreſents the manner in which the ſticks are held by the workman in cutting the diamonds. D, the inſide or cavity of the cutting-box. E, a ſlide covering another cavity in which they keep their rough diamonds.

Fig. 3. The ſkeve and its ſpindle repreſented in different views. A, elevation of the ſpindle. B, another elevation with its fuſee, and the ſkeve cut through its diameter. C, plan of the ſkeve, and its ſpindle in perſpective.

The diamond-cutter follows the work with his eyes, without taking any other ſhare in it than that of changing the place of the diamond to bite on a new ſurface; and of timely throwing upon it, with a few drops of oil, the minute particles of the diamonds firſt ground one againſt the other, to begin the cutting of them. The oriental ruby, ſapphire, and topaz, are cut on a copper wheel with diamond-duſt, tempered with olive-oil, and are poliſhed on another copper wheel with tripoli and water. The hyacinth, emerald, amethyſt, garnets, agates, and other ſtones not of an equal degree of hardneſs with the other, are cut on a leaden wheel with ſmalt and water, and poliſhed on a tin-wheel with tripoli. The turquois of the old and new rock, giraſol and opal, are cut and poliſhed on a wooden wheel with tripoli alſo.

The lapidaries of Paris have been a corporation ſince the year 1290. It is governed by four jurats, who ſuperintend their rights and privileges, viſit the maſter workmen, take care of the maſter-piece of workmanſhip, bind apprentices, and adminiſter the freedom.

Lapidary is alſo uſed for a virtuoſo ſkilled in the nature, kinds, &c. of precious ſtones, or a merchant who deals in them.

Lapidary-style denotes the ſtyle proper for monumental or other inſcriptions; being a ſort of medium between proſe and verſe.

LAPIDESCENT, that which has the quality of turning bodies into ſtone.

LAPIS, a general name for a ſtone of any kind.

Lapis *Lazuli*, a ſpecies of ſtone from whence the celebrated colour called ultramarine is made.

This is one of the ores of copper, the baſis of which is a debaſed cryſtalline matter, coloured with that elegant and beautiful blue, which copper gives to all alkaline liquors. It is a very hard and compact ſtone, inſomuch as to come into the rank of thoſe that take a high poliſh, and are not liable to be ſcratched by accidents; and, therefore, is worked in a number of different toys. It is found in detached lumps uſually of the ſize of a man's fiſt, often ſmaller, and ſometimes of four and five pounds weight. It is never covered with any coat or cruſt, but reſembles thoſe ſtones which have been waſhed off from whole ſtrata, and ſmoothed or rounded by accidents afterwards. It is of a naturally ſmooth and gloſſy ſurface, and its general colour is the elegant colour already mentioned; but this is variegated in a very beautiful manner with ſpots or clouds of white, and with veins of a fine ſhining gold colour. It has theſe variegations, in different degrees, in ſeveral maſſes, and, in general, moſt to be valued, as it has leaſt of them; for, though very beautiful to the eye, they are foreign to all the uſes they are put to, except when it is cut as a gem.

LAPSE, denotes a patron's neglect or omiſſion to preſent to a church within ſix months after it becomes vacant. When, after a vacancy, the patron does not preſent in ſix months, the ordinary has the next ſix months to collate to the benefice; and if he does not preſent within that time, the metropolitan has further ſix months to do it in; and if he ſhould fail in doing it in his time, the next ſix months devolve to the crown.

LAQUEUS, in ſurgery, a kind of ligature, ſo contrived, that when ſtretched by any weight, or the like, it draws up cloſe. Its uſe is to extend broken or diſjointed bones, to keep them in their places when they are ſet, and to bind the parts cloſe together.

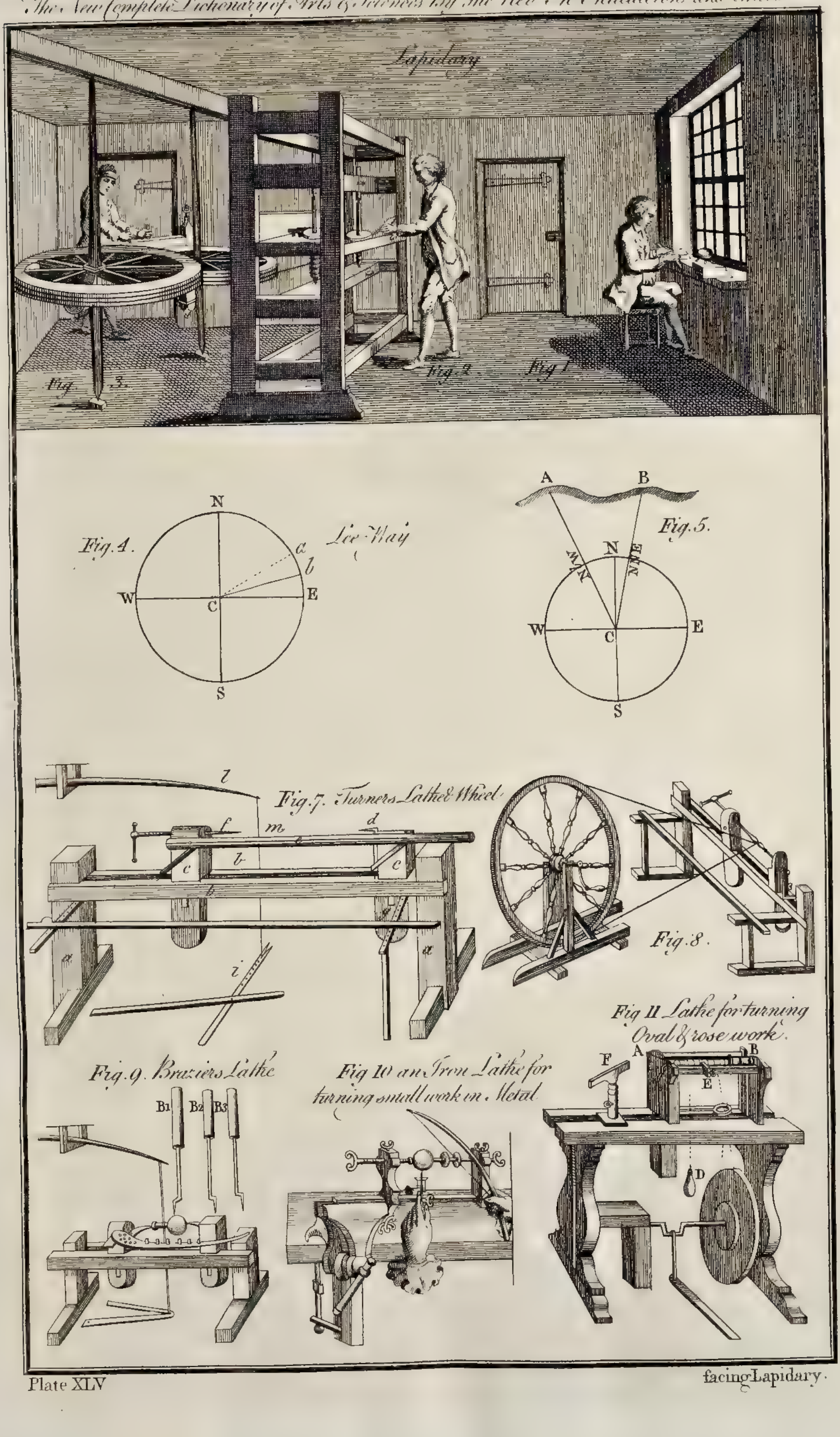
LARCENY, in law, a felonious carrying away another perſon's goods; and this, according to the value of the thing ſtolen, is either grand, or petit larceny; the firſt being ſtealing effects above the value of 1 s. and the laſt, ſuch as are either of that value, or under it: but where two perſons together ſteal goods to the value of only 13d. it is grand larceny in both; and if one perſon at different times ſteal ſeveral different things from the ſame perſon, which amount upon the whole to above 12d. value, they may be joined in one indictment, and the offender found guilty of grand larceny; but this is very ſeldom practiſed: on the contrary, the jury, where the theft appears to be the firſt offence, frequently bring in their verdict, as they lawfully may, that the things are not above 10d. value, and by that means reduce the offence to petit larceny, though the offender may perhaps be indicted for ſtealing to the value of 30 or 40s. and upwards. The crime of grand larceny is puniſhable with death, and that of petit larceny only with the corporal puniſhment of whipping, &c.

LARES, certain inferior deities among the ancient Romans, who were the guardians of houſes; they were alſo ſometimes taken for the guardians of ſtreets and ways; and Tibullus makes them the guardians of the fields.

LARIX, the Larch tree, in botany, a genus of trees, whoſe leaves, which are long and narrow, are produced out of little tubercles, in form of a painter's pencil: the cones are produced at remote diſtances from the male flowers on the ſame tree: the male flowers are very like ſmall cones at their firſt appearance, but afterwards ſtretched out in length.

LARK, *Alauda*, in ornithology, a diſtinct genus of birds; the characters of which are theſe: the tongue, which is membranaceous and pointed, has a rim or margin round it; the beak is ſtraight, and pointed; the two chaps equal in ſize; and the claw of the hinder toe longer than any of the other toes.

To this genus belong, 1. The ſky-lark, with the long winged feathers, variegated with white and brown. 2. The tit-lark, with a white line over the eyes. 3. The wood-lark, with the wings obliquely variagated with white. 4. The yellow-breaſted lark. 5. The ſnow-


Lapidary
Fig. 3.
Fig. 2
Fig 1
Fig. 4.
Lee Way
N
W
E
S
C
a
b
Fig. 5.
A
B
N
NW
NNE
W
E
S
C
Fig. 7. Turners Lathe & Wheel
l
f
m
d
b
c
c
b
a
a
i
Fig. 8.
Fig 11 Lathe for turning Oval & rose work.
A
B
E
F
D
Fig. 9. Braziers Lathe
B1
B2
B3
Fig 10 an Iron Lathe for turning small work in Metal

ſnow-bird, or pied chaffinch, with the tail feathers black, except the three lateral ones, which are white.

Lark-Spur, *delphinum*, in botany, a genus of the polyandria-trigynia claſs of plants, the corolla of which conſiſts of five unequal petals, diſpoſed circularly: the ſeeds are numerous and angular: theſe ſeeds called ſtaphiſagria, or ſtaveſacre, in the ſhops, are uſed to deſtroy vermin in childrens heads.

LARMIER, in architecture, a flat, ſquare, maſſive member of the cornice, between the cymatium and ovolo, and jutting out furtheſt: it is ſo called from its uſe, which is to diſperſe the water, and cauſe it to fall at a diſtance from the wall, drop by drop, or as it were by tears; larme, in French, ſignifying a tear. It is otherwiſe called corona. See Corniche.

LARYNX, the thick upper part of the aſpera arteria, or wind-pipe. The larynx is principally compoſed of five cartilages: the firſt is the thyroide or ſcutiform cartilage, which is of a kind of quadrangular figure, and ſtands in the anterior part; this is the largeſt of the five: the ſecond is the cricoide, or annular one; this occupies the loweſt part, by way of baſe to the reſt; and to the loweſt part of this, which is properly called the aſpera arteria, adheres: the third and fourth are the two arytænoide ones; theſe form, as it were, a kind of baſon of a ſingular figure, which is joined to the poſterior and ſuperior parts of the cricoides, by particular articulations on each ſide, that the glottis may be more eaſily opened and contracted: the fifth is the epiglottis. See Glottis, Epiglottis, &c.

The membrane which inveſts the larynx is very ſenſible, and is furniſhed with a number of oſcula or openings, which diſcharge a lubricating fluid. There are alſo glands extended over each ſurface of it, which ſerve for ſecreting a mucous fluid, for lubricating the whole aſpera arteria. The ventricles of the larynx are certain hollows, ſome of them ſmaller, and ſome larger; they are on the inſide of it, under the glottis, and ſerve to modulate the voice.

LASERPITIUM, Laser-Wort, a genus of the pentandria-digynia claſs of plants, the general corolla whereof is uniform; the partial one conſiſts of five nearly equal petals, inflexo-cordated at the ends; there is no pericarpium; the fruit is oblong, and ſeparable into two parts, and is ridged with eight longitudinal membranes; the ſeeds are two, very large, oblong, and ſemi-cylindrick, plane on the one ſide, but on the other ornamented on the back and edges with four membranes. The root of laſer-wort is ſaid to be good in the ſciatica, and for healing ſtrumæ, and other exreſcences.

LASH, or Lace, in the ſea language, ſignifies to bind and make faſt; as, to laſh the bonnet to the courſe, or the drabler to the bonnets: alſo the carpenter takes care that the ſpare yards be laſhed faſt to the ſhip's ſide; and in a rolling ſea, the gunners mind that the guns be well laſhed, leſt they ſhould break looſe. Laſhers are properly thoſe ropes which bind faſt the tackles and the breechings of the ordnance, when haled or made faſt within-board.

LASKETS, ſmall lines, like loops, ſewed to the bonnets and drablers of a ſhip, to laſh or lace the bonnets to the courſes, or the drablers to the bonnets.

LASKING, at ſea, is much the ſame with going large, or veering, that is, going with a quarterly wind. See Veer.

LASSITUDE, or Weariness, κοπ𝜎, in medicine, a morbid ſenſation, that comes on ſpontaneouſly, without any previous motion, exerciſe or labour. This is a frequent ſympton in acute diſtempers: it ariſes either from an increaſe of bulk, a diminution of proper evacuation, or too great a conſumption of the fluids neceſſary to maintain the ſpring of the ſolids, or from a vitiated ſecretion of that juice.

The remedy in the firſt caſe is evacuations; and in the other a proper diet, or ſuch alterative medicines as influence ſuch a ſecretion. See Evacuation and Secretion.

LAST, in general, ſignifies the burden or load of a ſhip. It ſignifies alſo a certain meaſure of fiſh, corn, wool, leather, &c. A laſt of cod-fiſh, white herrings, meal, and aſhes for ſoap, is 12 barrels; of corn or rape-ſeed, 10 quarters; of gun-powder, 24 barrels; of red herrings, 20 cades; of hides, 12 dozen; of leather, 20 dickers; of pitch and tar, 14 barrels; of wool, 12 ſacks; of ſtock-fiſh, 1000; of flax or feathers, 1700 lb.

Last, in the marſhes of Kent, is applied to a court held by the 24 jurats, in which orders are given for the impoſing and levying of taxes, for preſerving the ſaid marſhes.

Last-Heir, in law, he to whom lands come by eſcheat, for want of lawful heirs; who, in many caſes, is the lord whereof they are held, but in others the king.

LASTAGE, or Lestage, as defined by Raſtal, a duty exacted in ſome fairs and markets, for carrying things bought, whither one will; but, according to another author, it is the cuſtom paid for wares ſold by the laſt. It ſignifies alſo the ballaſt or lading of a ſhip; and ſometimes is uſed for garbage, rubbiſh, or ſuch like filth.

LATEN, or Latten. See Latten.

LATERAL Equation, in algebra, a ſimple equation, whoſe root is only in one dimenſion. See Equation.

LATERAN Councils, thoſe councils held in the baſilica of the Latin church at Rome. See Council. There have been five councils held in this place, viz. in the years 1123, 1139, 1179, 1215, and 1513.

Canons regular of the Congregation of the Lateran, were introduced in the time of pope Leo I. and continued in the church till the reign of Boniface, who diſplaced them, and put ſecular canons in their room; but 150 years after, the regulars were reinſtated again.

A LATERE, a term uſed to denote the qualifications of cardinals whom the pope ſends as legates into foreign courts, who are called legates a latere, as being his holineſs's aſſiſtants and counſellors in ordinary; theſe are the moſt conſiderable of the three other legates, being ſuch as the pope commiſſions to take his place in councils, and ſo called in regard that he never gives this office to any but his favourites and confidants, who are always a latere, at his ſide. A legate a latere has the power of conferring benefices without a mandate, of legitimating baſtards, to hold offices, and has a croſs carried before him, as the enſign of his authority.

De Latere, legates who are not cardinals, but yet are entruſted with an apoſtolical legation. See Legate.

LATH, in building, a long thin and narrow ſlip of wood, nailed to the rafters of a roof or ceiling, in order to ſuſtain the covering.

Of cleaving Laths. The lath-cleavers having cut their timbers in lengths, they cleave each piece with wedges, into 8, 12, or 16, according to the ſize of their timber; theſe pieces are called bolts: this is done by the felt-grain, which is that grain which is ſeen to run round in rings at the end of a piece of a tree. Thus they are cut out for the breadth of the laths, and this work is called felting. Afterwards they cleave the laths into their proper thickneſſes with their chit by the quarter grain, or that which runs in ſtraight lines towards the pith.

LATHE, an engine uſed in turning wood, ivory, and other materials. (See *plate* XLV. *fig.* 7.) It is compoſed of two legs or ſtyles, *a a*, which are commonly about two feet ten inches high, on the upper part of which are faſtened two pieces of wood called cheeks, *b*, *b*, parallel to the horizon; between theſe are two pieces of wood, called puppets, *c*, *c*, made to ſlide between the cheeks, and to be fixed down at any point at pleaſure; near the upper end of one of theſe puppets is faſtened a ſtrong ſpike of tempered ſteel, *d*, and oppoſite to it, in the other, is an iron ſcrew, *f*; by theſe the piece to be turned is ſuſtained, and is turned round by means of the ſtring *m*, put round it, and faſtened above to the pliable pole *l*, and underneath to the treddle or board *i*, moved with the foot; there is alſo a piece of wood between the cheeks, called a reſt, *e*, whoſe office is to reſt the tool upon, that it may lie in a ſteady poſition while the workman uſes it.

When turners perform heavy work, which the pole and treddle will not command, they uſe inſtead of theſe a wheel (*fig.* 8.) which is turned about, ſometimes with one and ſometimes with two handles, according to the weight of the work; its ſtring hath both its ends neatly faſtened together, and this being fixed in a groove round the edge of the wheel, and after being croſſed, put round a groove in the work, it is eaſily turned round with a

swift and regular motion. This is the most expeditious method of working; for the springing up of the pole makes an intermission in the turning of the work, but with the wheel it always turns the same way, so that the tool need never be taken off, unless it be to examine the work as it is doing.

Braziers, who turn pots, kettles, &c. have their lathe made in a different manner from that used by turners, as may be seen in *fig.* 9.

The puppets and rests are much stronger than those used by the turners: their edge-tools, which they call hooks, are also of a different shape from the chissels and other tools used by turners, as may be seen *ibid.* marked B 1, B 2, B 3, being bent backwards and forwards at the cutting end. And as the common turners work with a round string made of gut, the braziers work with a flat leather thong, which wrapping close and tight about the roller of their mandril, commands it with the greater ease, and turns it more forcibly about.

Fig. 10. represents a lathe for turning small work in metal. The left-hand holds the tool in a small hand-vice, and the right-hand turns the work with the bow.

In turning oval or rose-work, the common turner's lathe must be provided with the additional parts represented in *fig.* 11. which exhibits the whole machine with all its parts ready for working, A, being the fore-puppet, with its apparatus; B, the hinder puppet; C, a hollow axis, turned into a screw-fashion, to direct the weight D, by means of the nut E; and F, the support of the tools, which may be raised or lowered at pleasure.

LATHE, or *Leth*, as used in Kent and Sussex, is part of a county, containing three or four hundreds.

LATHRÆ, in botany, a genus of the didynamia angiospermia class. The calix consists of four segments; and the capsule has but one cell. There are four species, only one of which, viz. the squamaria, or toothwort, is a native of Britain.

LATHYRUS, chickling-pea, in botany, a genus of plants, the corolla of which is papilionaceous; the fruit is a very long, cylindrick, or compressed, acuminated pod, consisting of two valves; the seeds are numerous, of a cylindrick, globose, or somewhat angular figure.

LATIFOLIOUS TREES and PLANTS, such as have broad leaves.

LATIN, a dead language, first spoken in Latium, and afterwards at Rome; and still used in the Romish church, and among many of the learned.

This language is principally derived from the Greek, and particularly from the Eolick dialect of that tongue, though it has a great number of words which it borrowed from the language of the Etrusci, Osci, and other ancient people of Italy; and foreign commerce and wars, in course of time, added a great many more.

The Latin is a strong nervous language, perfectly suitable to the character of the people who spoke it; we have still works of every kind, admirably well written in the Latin; though there are vast numbers lost. The Latin is more figurative than the English, less copious than the Greek, less pompous than the Spanish, less delicate than the Italian, but closer and more nervous than any of them.

The Latin tongue was for a while confined almost wholly within the walls of Rome; nor would the Romans allow the common use of it to their neighbours, or to the nations they subdued: but by degrees they in time became sensible of the necessity of its being generally understood, for the conveniency of commerce; and accordingly used their endeavours that all the nations subject to their empire, should be united by one common language, so that at length they imposed the use of it, by a particular law for that purpose. After the translation of the seat of the empire from Rome to Constantinople, the emperors of the east being always desirous of retaining the title of Roman emperors, appointed the Latin to be still used; but at length neglecting the empire of the west, they abandoned all care of the Latin tongue, and used the Greek. Charlemagne coming to the empire of the west, revived this language; but at length it gave way, and the French took place of the Latin: it was, however, prodigiously degenerated before it came to be laid aside; in which condition it was found at the time of the reformation, when Vives, Erasmus, &c. began to open the way for its recovery; since which time the monkish latinity has been declining, and all endeavours have been used to retrieve the pure language of the Augustan age.

LATITAT, a writ which issues out of the King's Bench, so denominated from a supposition that the defendant lies lurking and concealed, after having fled out of Middlesex, into some other county; to the sheriff whereof this writ is directed, commanding him to apprehend the defendant there.

LATITUDE, in geography, the distance of any place from the equator, measured in degrees, minutes and seconds, upon the meridian of that place; and is either north or south, according as the place is situated either on the north or south side of the equator: thus let *l* (*plate* XLVI. *fig.* 6, 7.) represent London, *p* the north pole, *e q* equator; then will *p l e s* be the meridian of London, and the arch *e l* the latitude of London, which being equal to 51° 32′, the latitude of London, is said to be 51° 32′ north.

The latitude of a place is always equal to the elevation of the pole above the horizon: thus *l e*, the latitude of London, is equal to the arch *p o*, the elevation of the pole *p* above the horizon *h o*.

Complement of the LATITUDE, in geography, is the number of degrees, minutes, and seconds, which, added to the latitude, make it equal to 90°: thus the complement of the latitude of London is 38° 28′; for 38° 28′ added to 51° 32′ is equal to 90°.

The complement of the latitude is always equal to the elevation of the equator above the horizon, or the angle intercepted between the plane of the equator and the plane of the horizon.

Thus let *l* (*plate* XLVI. *fig.* 7.) be London, the latitude of London is the arch *e l*; the complement of the latitude is the arch *e h*, which measures the elevation of the equator *e q*, above the horizon *h o*, or the angle *e i h*, intercepted between the planes of the equator and horizon.

Circles of LATITUDE, in astronomy, are secondaries to the ecliptick, or circles drawn on the sphere of the heaven, perpendicular to the ecliptick, and interfecting each other in the poles of the ecliptick.

LATITUDE *of a Star* or *Planet*, in astronomy, is its distance from the ecliptick in degrees, minutes and seconds, measured on a circle of latitude drawn through that star or planet, and may be either north or south, as the object is situated either on the north or south side of the ecliptick.

The ecliptick is drawn on the common celestial globes, by which we may see what constellations it passes through, there are also usually fix circles of latitude, which by their mutual intersections shew the poles of the ecliptick, as well as divide it into 12 equal parts, answerable to the number of months in a year.

Plate XLVI. *fig.* 8. represents a celestial globe, where A G is the ecliptick, N the north, S the south pole of the ecliptick, N A S, N B S, N C S, N D S, &c. are circles of the latitude, or rather halves of them, which is as much as can be seen at one view upon the convex of the solid globe. The star H is in so many degrees, minutes and seconds of north latitude as the arch H A amounts to; the star I is in south latitude, the quantity whereof is measured by the arch I B.

From what has been said it appears, that we must carefully distinguish the different notions of latitude, when applied to stars in the heaven, or places on the earth; that is, between latitude in astronomy and latitude in geography; for in the heaven, or upon the celestial globe, it is the distance from the ecliptick; but, upon the earth, or upon the terrestial globe, it is the distance from the equator. Indeed, sometimes we consider the distance of the heavenly bodies from the celestial equator; but this is called declination. See DECLINATION. The latitude of a planet is either heliocentrick or geocentrick:

Heliocentrick LATITUDE *of a Planet*, is the latitude it would appear in to a spectator placed in the sun.

Geocentrick LATITUDE *of a Planet*, is the latitude it appears in to an inhabitant of the earth. See GEOCENTRICK *Latitude*.

To illustrate the difference between the heliocentrick and geocentrick latitude of a planet, let A B (*plate* XLVI. *fig.* 9.) be the orbit of the earth, C D the orbit of Mars,

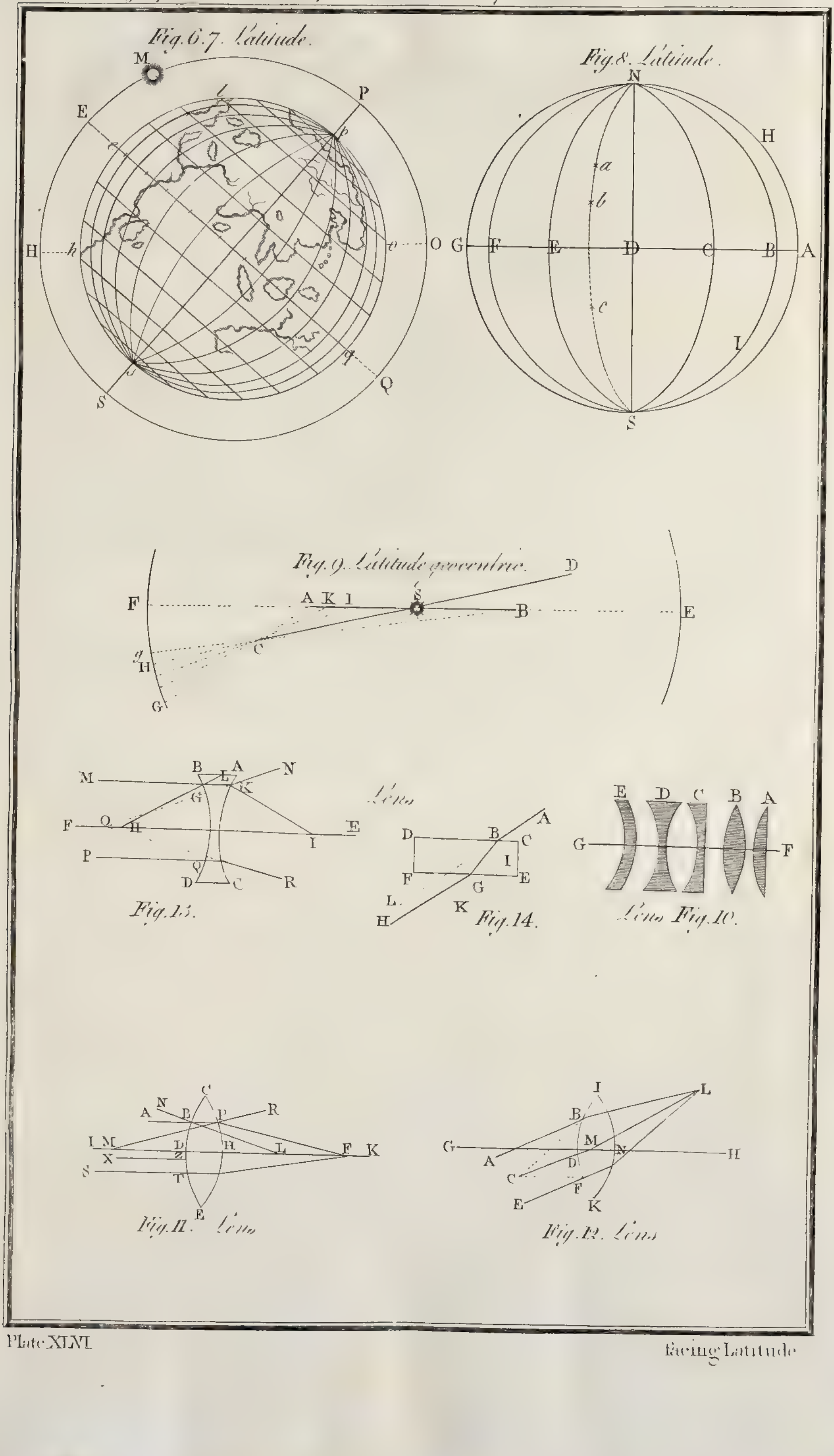


Fig. 6.7. Latitude.

Fig. 8. Latitude.

Fig. 9. Latitude geocentric.

Fig. 13.

Fig. 14.

Lens Fig. 10.

Fig. 11. Lens

Fig. 12. Lens

Mars, both viewed with the eye in their common fection continued, whereby they appear ftraight lines; let E and F be oppofite points of the ecliptick: fuppofe Mars to be in his fouth limit at C, if he were at that time viewed from S, the centre of the fun, he would appear in the fphere of the heaven at the point H; his heliocentrick latitude then is F H. But let Mars in C be viewed from the earth, and he will appear in different places, according as the earth is in different parts of her orbit; for if the earth be at B, a line drawn from B through C fhews the apparent place of Mars to be at *g*, and his geocentrick latitude is then F *g*; if the earth be at A, the apparent place of Mars will be in G, and his geocentrick latitude F G; if the earth be in any other part of her orbit, as at the point I or K, it is eafy to fee, by a line drawn from either of thofe points through Mars at C, that he will appear in different places in the fphere of the heaven, and would be in different geocentrick latitudes.

North afcending LATITUDE *of the Moon*, when fhe proceeds from the afcending node towards her northern limit or greateft elongation.

North defcending LATITUDE, is when the moon returns from her northern limit to the defcending node.

South defcending LATITUDE, when fhe proceeds from the defcending node to her fouthern limit.

South afcending LATITUDE, when fhe returns from her fouthern limit to her afcending node.

And the fame things hold good of the other planets.

LATITUDINARIAN, a perfon of moderation with regard to religious opinions, who believes there is a latitude in the road to heaven, which may admit people of different perfuafions. In this fenfe all proteftants are latitudinarians, fince they allow that many among the papifts may be faved; though the bigotry of thefe laft will not permit them to allow the fame with refpect to proteftants.

LATTEN, denotes iron plates tinned over, of which tea-canifters are made.

Plates of iron being prepared of a proper thinnefs, are fmoothed by rufting them in an acid liquor, as common water made eager with rye: with this liquor they fill certain troughs, and then put in the plates, which they turn once or twice a-day, that they may be equally rufted over; after this they are taken out and well fcowered with fand, and, to prevent their rufting again, immediately plunged into pure water, in which they are to be left till the inftant they are to be tinned or blanched, the manner of doing which is this: they flux the tin in a large iron crucible, which has the figure of an oblong pyramid with four faces, of which two oppofite ones are lefs than the two others. The crucible is heated only from below, its upper part being luted with the furnace all round. The crucible is always deeper than the plates, which are to be tinned, are long; they always put them in downright, and the tin ought to fwim over them; to this purpofe artificers of different trades prepare plates of different fhapes, though Mr. Reaumur thinks them all exceptionable. But the Germans ufe no fort of preparation of the iron, to make it receive the tin, more than the keeping it always fteeped in water, till the time; only when the tin is melted in the crucible, they cover it with a layer of a fort of fuet, which is ufually two inches thick, and the plate muft pafs through this before it can come to the melted tin. The firft ufe of this covering is to keep the tin from burning; for if any part fhould take fire, the fuet would foon moiften it, and reduce it to its primitive ftate again. The blanchers fay, this fuet is a compounded matter; it is indeed of a black colour, but Mr. Reaumur fuppofed that to be only an artifice to make it a fecret, and that it is only coloured with foot or the fmoke of a chimney; but he found it true fo far, that the common unprepared fuet was not fufficient; for after feveral attempts, there was always fomething wanting to render the fuccefs of the operation certain. The whole fecret of blanching, therefore, was found to lie in the preparation of this fuet; and this, at length, he difcovered to confift only in the firft frying and burning it. This fimple operation not only gives it the colour, but puts it into a condition to give the iron a difpofition to be tinned, which it does furprifingly.

The melted tin muft alfo have a certain degree of heat, for if it is not hot enough, it will not ftick to the iron; and if it is too hot, it will cover it with too thin a coat, and the plates will have feveral colours, as red, blue and purple, and upon the whole will have a caft of yellow. To prevent this, by knowing when the fire has a proper degree of heat, they might try with fmall pieces of iron; but in general, ufe teaches them to know the degree, and they put in the iron when the tin is at a different ftandard of heat, according as they would give it a thicker or thinner coat. Sometimes alfo they give the plates a double layer, as they would have them very thickly covered. This they do by dipping them into the tin when very hot the firft time, and when lefs hot the fecond. The tin which is to give the fecond coat, muft be frefh covered with fuet, and that with the common fuet, not the prepared.

LATTEN-BRASS, plates of milled brafs, reduced to different thickneffes, according to the ufes it is intended for.

LATUS RECTUM, in conick fections, the fame with parameter. See PARAMETER.

LATUS TRANSVERSUM, in the hyperbola, that part of the tranfverfe diameter, intercepted between the vertices of the two oppofite fections. See HYPERBOLA.

LAVANDULA, lavender, in botany, a fhrubby plant, which its leaves fet in pairs, the ftalks fquare when young, and round when grown woody; producing, on the tops of the branches, naked fpikes of blue labiated flowers, of which the upper lip is erect and cloven, the lower divided into three roundifh fegments.

LAVANDULA *Minor five Spica*, lavender with oblong, very narrow, fomewhat hoary, undivided leaves; a native of dry gravelly foils in the fouthern parts of Europe, common in our gardens, and flowering in July. The flowers of lavender have a fragrant fmell, to moft people agreeable, and a bitterifh, warm, fomewhat pungent tafte: the leaves are weaker, and lefs grateful. They are often employed as a perfume; and medicinally, as mild ftimulants and corroborants, in vertigoes, palfies, tremours, and other debilities of the nervous fyftem, both internally and externally. The flowers are fometimes taken in the form of conferve; into which they are reduced, by beating them, while frefh, with thrice their weight of double refined fugar. Their fragrance is lefs injured by beating or bruifing them, than moft of the other odoriferous flowers, but is neverthelefs confiderably diminifhed: the flavour of the leaves is of a much lefs deftructible kind.

LAVANDULA *Major five vulgaris*, broad lavender, with longer, wider, and hoarier leaves, and much larger fpikes, though fmaller flowers; common in the fouthern parts of Europe, but rare among us. The name fpike is applied by foreign writers to this fpecies, by fome of ours to the firft.

The broad-leaved lavender is ftronger both in fmell and tafte than the narrow, and yields in diftillation almoft thrice as much effential oil; but the flavour both of the oil and of the plant itfelf, is much lefs grateful: the oil is likewife of a much darker colour, inclining to green. Watery and fpirituous extracts, made from the two forts of lavender, are very nearly alike; the difference feeming to refide only in the volatile parts.

LAUDANUM, a preparation of opium. See OPIUM.

LAVENDER, the fame with lavandula. See LAVANDULA.

LAVER, a facred utenfil in the temple of Jerufalem, confifting of a bafon, whence they drew water by cocks.

LAUNCH, among failors, a fort of boat ufed by the French, Italian, and Spanifh fhips; and is peculiar to thofe who are employed in the Mediterranean trade, being better fitted for the ports of that fea than a long-boat, than which it is generally much longer, and more flat-bottomed, and alfo fharper before. See BOAT.

LAUNCHING *a Ship or Boat*, pufhing them into the water from an afcent.

LAURUS, the bay-tree, in botany, a tree too well known to need any defcription here.

The leaves and berries of the bay-tree, or common laurus, are only ufed in medicine, and are warm carminatives, and fometimes exhibited in this intention againft flatulent colicks; and likewife in hyfterical diforders. Their principal ufe, in the prefent practice, is in clyfters, and fome external applications. The leaves

enter our common fomentation, and the berries the plaſter and cataplaſm of cummin; they alſo give name to an electuary, which is little otherwiſe uſed than in clyſters.

LAW, in general, is defined to be a certain rule for the good government of mankind in ſociety. See the article GOVERNMENT.

This rule or law is nothing but a decree, by which the ſuperior obliges thoſe ſubject to him, to accommodate their actions to the directions preſcribed therein. But that a law may exert its force in the minds of thoſe to whom it is promulgated, it is requiſite that the law-giver and the law be likewiſe known. The legiſlator of the laws of nature can be no other than the Creator of the univerſe. No man in civil ſociety can be ignorant who it is that has power over him; and of the laws he has notice given him, by a publication plainly and properly made, in which thoſe two things ought to be aſcertained, that the author of the law is he who hath the ſupreme authority in the community, and that this or that is the true meaning of the law. The firſt is known, if it be promulged with his own mouth, under his own hand, or if it be done by proper delegates regularly admitted to that office: they muſt be thus judiciouſly executed, and, beſides that, contain nothing derogatory to the ſovereign power. As to the true ſenſe, after the greateſt plainneſs uſed by the promulgers, an explication is to be ſought of the legiſlator, or thoſe who are publickly appointed to give judgment according to law. See JUDGE.

Every perfect law has two parts; the one directing what is to be done, or omitted; the other declaring the puniſhment incurred, by neglecting to do what is commanded, or attempting what is prohibited. And herein all the force of law conſiſts. See PUNISHMENT.

Law may be divided, with reſpect to its authors, into divine and human: the former may be conſidered as two-fold, to wit, natural or moral, and poſitive. Natural law is that which God has made known to mankind by the light of natural reaſon. Poſitive law is that which he has revealed by his prophets: ſuch were the laws delivered to the Jews relating to the divine worſhip and polity peculiar to that people.

Civil or human laws, conſidered with reſpect to the legiſlator's two offices, of judging and compelling, may be divided into diſtributive and penal. Diſtributive law is that which gives every ſubject what properly belongs to him, forbidding others to injure him either in his privileges or property: and penal law is that which determines, or appoints, what puniſhments ſhall be inflicted on thoſe who violate the diſtributive laws; it is mandatory, and ſpeaks only to the publick officers, or magiſtrates.

LAW, more eſpecially, denotes what is lawful with us and not elſewhere.

LAW *of Arms*, that which regulates the proclaiming of war, making and obſerving leagues, attacking an enemy, and puniſhing offenders in the camp.

LAW *of Marque*, or *Letters of Marque*, that by which perſons take the goods or ſhipping of the party that has wronged them, as in time of war, whenever they can take them within their precincts.

LAW *Merchant*, or LAW *of the Staple*, a ſummary ſort of law, now become a part of the laws of England; one point of it conſiſts in this, that if there be two joint merchants of wares, and one dies, his executor ſhall have the moiety; which is only allowed in the caſe of merchants.

LAW *Spiritual*, the ſame with canon or eccleſiaſtical law.

LAWS *of Nature*, or *Motion*, in phyſicks, are axioms or general rules of motion and reſt, obſerved by all natural bodies in their actions on one another; of theſe Sir Iſaac Newton has eſtabliſhed the three following:

1. All bodies continue their ſtate of reſt or uniform motion in a right line, till they are made to change that ſtate by ſome external force impreſſed upon them.

This law is no other than that univerſal property of bodies, called paſſiveneſs or inactivity: whereby they endeavour to continue the ſtate they are in, whatever it be. Thus a top only ceaſes to run round, on account of the reſiſtance it meets with from the air, and the friction of the plane whereon it moves. And a pendulum, when left to vibrate in vacuo, where there is nothing to ſtop it, but the friction ariſing from the motion of the pin on which it is ſuſpended, continues to move much longer than one in the open air.

2. The change of motion, produced in any body, is always proportionable to the force, whereby it is effected; and in the ſame direction wherein that force acts.

This is an immediate conſequence of this axiom, the effect is always proportionable to its cauſe. For inſtance, if a certain force produces a certain motion, a double force will produce double the motion; a triple force, triple the motion, &c. If a body is in motion, and has a new force impreſſed on it in the direction wherein it moves, it will receive an addition to its motion, proportional to the force impreſſed; but, if the force acts directly contrary to its motion, the body will then loſe a proportional part of its motion: again, if the force is impreſſed obliquely, it will produce a new direction in the motion of the body more or leſs different from the former, in proportion to its quantity and direction.

3. Re-action is always contrary and equal to action; or the actions of two bodies upon each other are equal, and in contrary directions.

Thus, ſuppoſe a ſtone or other load to be drawn by an horſe; the load re-acts upon the horſe, as much as the horſe acts upon the load; for the harneſs which is ſtretched equally between them both ways, draws the horſe towards the ſtone, as much as it does the ſtone towards the horſe; and the progreſſive motion of the horſe is as much retarded by the load, as the motion of the load is promoted by the endeavour of the horſe. This will be better explained from the following inſtance: let a perſon ſitting in a boat draw another boat equally heavy towards him, they will both move towards each other with equal velocities: let the boat he ſits in be the lighteſt, and it will move the faſteſt; becauſe, the action being equal on both ſides, the ſame quantity of motion will be given to each boat, that is, the leſſer will have the greater velocity.

We have a further confirmation of this from attraction. Suppoſing two bodies attracting one another, but prevented from coming cloſe together by ſome other body placed between them: if their reſpective actions, by which they tend towards each other, were not equal on both ſides, then would the intermediate body be preſſed more one way than the other, and ſo all three would begin to move by themſelves the ſame way; but that three bodies ſhould be put in motion after this manner, when no external force acts upon them, is contrary to experience; conſequently, whatever different degrees of force any two bodies may be capable of exerting, their mutual actions on each other are always equal. This may be tried with a loadſtone and iron; which being put into proper veſſels, contiguous to one another, and made to float on the ſurface of the water, will be an exact counterbalance to each other, and remain at reſt, whatever be the attractive power of the load-ſtone, or the proportion of their reſpective magnitudes.

Theſe laws receive an abundant additional proof from hence, viz. that all the concluſions that are drawn from them in relation to the phænomena of bodies, how complicated ſoever their motions be, are always found to agree perfectly with obſervation. The truth of which ſufficiently appears in all parts of the Newtonian philoſophy.

LAWN, a large plain in a park, or adjoining to ſome grand ſeat. The moſt convenient ſituation is on the ſouth or ſouth-eaſt ſide of a houſe. If the lawn be a ſquare, three avenues may break out from three of the angles, and meet in the fourth angle oppoſite to the houſe: it may be bounded with walks or a ſingle row of lime trees ſet at a good diſtance from one another. A circle is a good figure for a lawn, but muſt break off before it comes againſt the front. A triangle is a very proper figure, but ſhould be obtuſe or right-angled next the front. Many perſons have preferred the lime-tree for this purpoſe, on account of their regular growth: but as the leaves of this tree often change their colour, and begin to fall very ſoon in the autumn, occaſioning a great litter in the garden; and from the end of July the trees make but an indifferent appearance; ſo they are not to be eſteemed for theſe plantations. The elm, oak, beech, and cheſnut, among the deciduous trees, are to be preferred to all others, as they keep their leaves late in

autumn: and these are all of them large growing trees; so are very proper for this purpose.

LAXATIVE MEDICINES, are such as regard either the belly or entire habit, and produce this effect by some softening quality that takes away the tensity of the fibres, and facilitates the passage of the contents in the internal tube.

LAY *Brothers*, among the Romanists, those pious, but illiterate persons, who devote themselves, in some convent, to the service of the religious.

LAY *Land*, or LEY *Land*, in husbandry, fallow-ground, or such as lies untilled.

LAY *Man*, one who follows a secular employment, or has not entered into holy orders.

LAY *Man*, among painters, a small statue, either of wax or wood, whose joints are so formed, that it may be put into any attitude or posture. Its principal use is for adjusting the drapery in cloathing of figures.

LAYERS, in gardening, are tender shoots, or twigs of trees, laid or buried in the ground; till having struck root, they are separated from the parent-tree, and become distinct plants. Many trees may be thus propagated by layers; the ever-greens about Bartholomew-tide, and other trees about the month of October. The operation is performed by slitting the branches a little way, and laying them about half a foot under the mould: the ground should first be made very light, and after they are laid, they should have a little water given them. If they do not comply well in laying them down, they must be pegged down with a hook or two; and if they have taken sufficient root by the next winter, they should be cut off from the main plants, and planted in the nursery. Some twist the branch, or bare the rind; and if it be out of the reach of the ground, they fasten a tub or basket near it, which they fill with good mould, and lay the branch in it.

LAZARETTO, or LAZAR-HOUSE, a publick building, in the nature of an hospital, to receive the poor and those afflicted with contagious distempers; in some places, lazarettos are appointed for the performance of quarantine; in which case, those are obliged to be confined in them who are suspected to have come from places infected with the plague.

LAZULI. See LAPIS LAZULI.

LEAD, *Plumbum*, in natural history, a coarse, impure metal, called Saturn by the chymists.

Lead is the heaviest of metals next after gold; it is, indeed, considerably lighter than quicksilver, but the want of malleability denying that substance a place in the class of metals, lead is among them the second in weight. It is the softest of all the metals; easily flattened under the hammer, and ductile in a very great degree, though much less so than gold. Its colour is a pale bluish grey, it is very little subject to rust, and is the least sonorous of all the metals, except gold, with which it seems nearly on an equality, in regard to this property in its common state; but Mr. Reaumer has discovered that, if cast in the form of a segment of a sphere, it has some sound when struck upon; a property which gold does not acquire by being cast in the same form. See GOLD.

It requires the least degree of fire of all metals, except tin, to put it in fusion. It acquires this fluid state long before it changes its colour; whereas the other metals, except tin, all become red-hot before they run: after melting, it very readily calcines into a grey powder, which, if the fire be increased and the matter often stirred, becomes yellow, and afterwards of a fine florid red: this is the minium, or common red lead of the shops. If the fire be made yet more vehement, it runs into an oleaginous matter, which, as it cools, becomes of a yellowish or redish colour, and is composed of a number of thin laminæ; this is litharge. Though these several substances have nothing of the appearance of the metal they are produced from, yet, if a little iron filings be added to them over the fire, or only some pieces of charcoal, or any other oily inflammable matter be thrown in, they become lead again. The scoriæ of lead, left to themselves in a strong fire, always run into glass, and in that form make their way through all sorts of vessels.

Lead very readily and easily amalgamates with mercury, and as readily mixes in fusion with all the other metals, except iron, though less easily with copper than the rest. The specifick gravity of lead is to that of water as 11325 to 1000.

Lead, when in the bowels of the earth, enters into the body of crystals, as is very frequently the case with that crystal which is found about lead mines, and influences its figure so far as to give it a cubick form. It often does this without altering its colour: but when it tinges it also, the colour it gives is yellow.

Lead is more easily separated from its common ore than any other metal; there requires nothing for this purpose but a common wood-fire, kept up to a due strength by a blast of bellows. The lead-ore is thrown into this fire upon the wood, and the melted metal runs into a hollow at the bottom of the furnace made to receive it, from which they ladle it out, and cast it into large masses. Such ores of lead as contain earth and stones are to be powdered and washed before they are committed to the fire, and such as contain pyrites or marcasite, which is no uncommon thing, must be roasted two or three times, in order to burn away the sulphur they are debased with; then powdered and washed, in order to their being committed to the fire, and finally mixed with the common black flux, if very refractory. See FLUX.

If there be any occasion to separate lead from a mixture of copper in the regulus, nothing is more easy than to do it by a common fire; the heat of which being enough to melt lead, though not to fuse copper, will run it all off, and leave the copper pure behind.

Lead is much used in building, especially for coverings, gutters, pipes and glazing; for which uses it is either cast into sheets in a mould, or milled; which last is by much the least serviceable, not only on account of its thinness, but also because it is so exceedingly stretched in milling, that when it comes to lie in the hot sun, it shrinks and cracks, and consequently will not keep out the water. For the manufacture of all which, see PLUMBERY.

Lead has been celebrated by the chemical writers for very great virtues in medicine, but, upon the whole, it seems to be a metal very cautiously to be given internally, and rather calculated for outward application. Its ore is poisonous: the steam which arises from the furnace where it is worked, infects the grass of all the neighbouring places, and kills the animals that feed on it; and among the preparations of it, the salt called saccharum saturni, which is by much its best form for medicine, and which is able to do great service, in hæmorrhages and some other cases; is apt, however, to bring on cholicks of a very violent kind, and so many other disorders, that the remedy often proves worse than the disease.

The preparations of lead are, 1. Minium, or red lead. 2. Litharge. 3. Burnt-lead, plumbum ustum. 4. Ceruse. 5. Salt, or sugar of lead, saccharum saturni. See MINIUM, LITHARGE, CERUSE, and SACCHARUM SATURNI.

Burnt LEAD is thus prepared: cut a quantity of the thinnest milled lead that can be got into small plates; fill an earthern vessel, that will bear the fire, with these plates and powder of common brimstone, laid stratum super stratum; set it over the fire, and when the sulphur is burnt away, the lead will be found reduced to a blackish powder. Five ounces of sulphur will serve for half a pound of lead. The matter is to be stirred while it remains on the fire; and when it is cold, the powder is to be washed three or four times with common water, and then dried for use; being of the same virtue with litharge, or red-lead, in ointments and plasters. Mixed into an unguent with lard alone, it makes a good ointment for the piles. However, it ought to be remarked, that it is intended only for external use.

Besides the preparations already mentioned, we find mention of balsam and magistery of lead. Balm, or balsam of lead, is only an oil drawn, by distillation, from salt of lead dissolved in spirit of turpentine. Magistery of lead is the calx of lead purified and subtilised in aqua fortis; which, being several times washed, becomes extremely white, and is mixed with pomatums for the face and complexion.

LEAF, *Folium*, in the natural history of plants, a very essential and ornamental part of plants, whose chief office is to subtilise and give more spirit to the abundance

r̄ıce of nourifhing fap, and to convey it to the little n..

Botanifts confider the leaves of plants, with regard to their ftructure, their furface, figure, confiftence, edges, fituation and fize. With regard to their ftructure, they are either fingle, as thofe of the apple-tree and pear-tree; or double, as thofe of angelica and parfley. With refpect to their furface, they are either flat, as the nummularia and origany; or in bunches, as feveral kinds of kali and houfeleeks. With regard to their confiftence, they are either thin and fine, as thofe of St. John's wort; or thick and grofs, as thofe of feveral kinds of houfeleek: or woolly, as thofe of gnaphalium. With regard to their edges, leaves are either cut flightly, as fome fpecies of geums; or deep, as in fome of the jaceas. With regard to their fituation, they are either ranged alternately, as the alaternus; or oppofite to each other, as the phillyrea and the mints. With regard to their fize, they are either very large, as thofe of the colocafia and fphondylium; or moderate, as thofe of biftort and the fig-tree; or fmall, as thofe of the apple-tree and pear-tree; or very fmall, as that of St. John's wort.

Moft forts of fmall plants, and alfo feveral forts of trees, which put forth a root at the fmall end of the feed, put out two fmall leaves that are not at all like thofe that grow on the plant or tree, as foon as the root has taken hold of the ground; and afterwards between thefe falfe leaves there comes forth a fhoot which produces leaves like thofe of the plant or tree from which it came: of this manner of growth, there is an infinite number of plants and trees.

Doctor Grew juftly obferves, that the fibres of leaves are compofed of two general kinds of veffels, viz. thofe for fap and thofe for air; and, that thefe are ramified out of greater into lefs, like the veins and arteries in animals; and all naturalifts afcribe to them very important ufes; the moft fingular of which is, that they, in fome meafure, perform the fame office for the fupport of the vegetable life, as the lungs of animals do for the fupport of animal life; and, that it is highly probable, that plants draw fome part of their nourifhment from the air through their leaves. Thefe, in the fpring, receive the crude humours, divide them very minutely, and carry back great plenty of elaborated juice to the plant. By thefe a tranfpiration is carried on of what is unprofitable, anfwering to the difcharge in animal bodies made by fweat; for fometimes the excretory veffels of the leaves are fo over-charged by the great plenty of the diftending humour, or juice, that they burft in the middle, and let go the more fubtile parts; and it frequently happens, that, in a hot feafon, a great plenty of juices are this way difcharged and imbibed. Thus manna is found to exfude as well from the leaves as from the bark, efpecially if a cold night follow a hot day; and the fame thing frequently happens in feveral other plants and trees, as we learn from the bees flying to the lime-tree, that they may gather that gummous fubftance from its leaves; but if the heat be lefs, all the fuperfluous juices, except thofe which are, perhaps, tranfmitted by infenfible perfpiration through the arterial veffels, exhale naturally, and return into the trunk. It is alfo found, that the bibulous veffels, dried by the diurnal heat, imbibe, efpecially in the night-time, thofe watery vapours which arife in form of a very thin dew, and fo make amends for the lofs made by the arteries, by the new moiftures received. Laftly, the leaf ferves, in a fingular manner, to nourifh the eye, or gem, until growing by degrees to a greater bulk, it preffes the veffels of the foot-ftalk together, from whence the humour is, by little and little, ftopped in the leaf till it cannot any more return through the foot-ftalk; which, by the ceafing of the afflux and reflux of the nutritious juice, grows putrid, whence a confumption being caufed, the leaf dies, and falls off; which is the chief caufe of the falling of the leaves in autumn.

Some have made the obfervation, that all ever-greens have their woodclofe and compact between their annular circles; and, that their holding their leaves all the winter, proceeds from the nature of their fap, which is of a clammy and turpentine nature; and that this fap is eafily condenfed by the cold, and requires a great deal of heat to make it thin and put it in motion: thus a little cold, condenfes or ftiffens pitch or turpentine, but it muft be a froft that ftays the motion of water. From whence it happens, that thofe trees which hold their leaves, will grow much better under the droppings of other great trees, than fuch as fhed their leaves, becaufe their turpentine fap fhoots off the drops, and prevents their entering the veffels in too great quantities.

The various forms and kinds of leaves, as pinnated, digitated, crenated, haftated, &c.

Leaf, in architecture, the reprefentation of the leaf of the acanthus on the capital of the Corinthian and Compofite orders, which fee.

Leaf, in clocks and watches, an appellation given to the notches of their pinions. See Clock and Watch.

LEAGUE, a meafure of length, containing more or lefs geometrical paces, according to the different ufages and cuftoms of countries. A league at fea, where it is chiefly ufed by us, being a land meafure moftly peculiar to the French and Germans, contains 3,000 geometrical paces, or three Englifh miles. The French league fometimes contains the fame meafure, and in fome parts of France it confifts of 3,500 paces: the mean or common league confifts of 2,400 paces, and the little 2,000. The Spanifh leagues are larger than the French, 17 Spanifh leagues making a degree, or 20 French leagues, or 69 and an half Englifh ftatute miles. The Dutch and German leagues contain each four geographical miles. The Perfian leagues are pretty near of the fame extent with the Spanifh; that is, they are equal to four Italian miles, which is pretty near to what Herodotus calls the length of a Perfian parafang, which contained 30 ftadia, eight whereof, according to Stabo, make a mile.

League alfo denotes an alliance or confederacy between princes and ftates for their mutual aid, either in attacking fome common enemy, or in defending themfelves.

Leagues *of the Grifons*, are a part of Switzerland, confifting of three fubdivifions, viz. the upper league, the league of the houfe of God, and the league of the ten jurifdictions.

LEAK, among feamen, is a hole or cranny in the fhip, through which the water comes in.

LEAKAGE, the ftate of a veffel that leaks, or lets water, &c. ouze out or in.

Leakage, in commerce, an allowance of 12 per cent. to merchants importing wine, out of the cuftom thereof; and of two buarrels in 22 of ale to brewers, &c. out of the excife.

LEAP-YEAR, the fame with biffextile. See the article Bissextile.

The common year hath 365 days, but leap-year 366; in which laft cafe February hath 29 days, which in common years hath but 28.

To find the leap-year,

Divide the year by 4, what is left fhall be

For Leap-year 0, for paft 1, 2, or 3.

LEASE, in law, the letting of lands, tenements, &c. to another for life, term of years, or at will, for a rent referved. A leafe is either written, called an indenture, or deed-poll; or by word of mouth, called leafe-parole. The party who lets the leafe, is called leffor; and the party to whom it is let, leffee.

LEASH, *Leafe*, among fportfmen, denotes particularly three grey-hounds, foxes, bucks, or hares.

LEAVEN, whatever makes a body fwell and ferment. Beer, wine, cyder, &c. only work by means of the leaven in them. Sour pafte, barm, rennet, &c. are leavens ufed in baking bread, brewing beer, and making cheefe, &c.

LECTISTERNIUM, in antiquity, a religious feftival prepared among the Romans, and folemnly ferved up in a temple for the gods, whofe ftatues were fet upon beds placed around the tables. Hence the ceremony takes its name from lectus, a bed, and fterno, to fpread.

LEDGER. See Book-keeping.

LEE, at fea, generally denotes the part towards which the wind blows.

Lee-*Shore*, that on which the wind blows.

LEE-WAY is the angle that the rhumb-line, upon which the fhip endeavours to fail, makes with the rhumb upon which fhe really fails.

This is occafioned by the force of the wind, or furge of the fea, when fhe lies to the windward, or is clofe hauled; which caufes her to fall off and glide fide-ways from the point of the compafs fhe capes at. Thus, let

NESW (*plate* XLV. *fig.* 4.) represent the compass, and suppose a ship at C capes at, or endeavours to sail upon the rhumb C *a*, but by the force of the wind and surge of the sea she is obliged to fall off, and make her way good upon the rhumb C *b*; then the angle *a* C *b* is the lee-way: and if that angle be equal to one point, the ship is said to make one point lee-way; or if equal to two points, the ship is said to make two points lee-way, &c.

The quantity of this angle is very uncertain; because some ships, with the same quantity of sail, and with the same gale, will make more lee-way than others; it depending much upon the mould and trim of the ship, and the quantity of water that she draws. However, the common allowances made for lee-way, are these: 1. If the ship be close hauled, has all her sails set, the water smooth, and a moderate gale of wind, she is supposed to make little or no lee-way. 2. If it blow so fresh, as to cause the small sails to be handed, it is usual to allow one point. 3. If it blow so hard, that the tops must be close reeft, the ship then makes about two points lee-way. 4. If one topsail must be handed, it is common to allow two and three quarters or three points lee-way. 5. When both topsails must be handed, they allow about four points lee-way. 6. When it blows so hard as to occasion the fore course to be handed, the allowance is between five and a half and six points. 7. When both main and fore courses must be handed, then six, or six and a half points must be allowed for her lee-way. 8. When the mizzen is handed, and the ship is trying a hull, she then makes her way good about one point before the beam, that is, about seven points lee-way.

Though these rules are such as are generally used, yet as the lee-way depends much upon the mould and trim of the ship, we shall here give the method of ascertaining it by observation: thus let the ship's wake be set by a compass in the poop, and the opposite rhumb is the true course made good by the ship; then the difference between this and the course given by the compass in the bittacle, is the lee-way required. If the ship be within sight of land, the lee-way may be exactly found by observing a point on the land which continues to bear the same way; for the distance between the point of the compass it lies on, and the point the ship capes at, will be the lee-way: Thus, suppose a ship at C (*fig.* 5.) is lying up at N *b* W, towards A; but instead of keeping that course, she is carried on the NNE line CB, and consequently the point B continues to bear always the same way from the ship: here it is evident, that the angle ACB, or the distance between the N *b* W line that the ship capes at, and the NNE line that the ship really sails upon, will be the lee-way.

LEES, the grossest parts of wine, oil, &c. being the sediment found at the bottom of the vessel. The word is French *lie*, which signifies the same thing, and derived, according to Du Cange, from *lia*, a corrupt Latin word of the same import. A kind of gravelly sand is made of the lees of wine burnt and prepared, which is used by dyers, &c. And the vinegar-makers drive a great trade with lees of wine dried and made into cakes, out of which all the liquor has been pressed.

LEET, *Leta*, a court held by the lord of a manor, the authority of which is originally derived from the crown. A court-leet is a court of record, and enquires of all offences under high-treason, though it cannot punish any, but must certify them to the justice of assize.

LEG, *crus*, in anatomy, the whole lower extremity from the acetabula of the ossa innominata, commonly divided into three parts, viz, the thigh, the leg properly so called, and the foot. The leg consists of three bones, the tibia, fibula, and rotula; or, as it is otherwise called, the patella. See TIBIA, FIBULA, &c. For the arteries, veins, nerves, and muscles of the leg, see ARTERY, NERVE, VEIN, and MUSCLE.

LEGACY, *Legatum*, in the civil law, a donation given by testament, which in common law is denoted by demise. When by a last will and testament an estate is transferred on another, it is called hæreditas, and he, hæres. Though, in common law, he to whom a man's lands and hereditaments descend by right of blood is hæres natus; the other to whom it is bequeathed, hæres factus.

LEGACY, in an ecclesiastical sense, a bequest to the church which was to hold good, even though the testament were declared null.

LEGATE, a prelate, whom the pope sends ambassador to any sovereign prince.

LEGATORY, in antiquity, a government administered by a lieutenant or legatus.

LEGATUS, among the Romans, a military officer, answering to our lieutenant-general, who commanded under the chief general, or imperator, and also one who governed in the provinces under the proconsul or governor.

LEGEND, *Legenda*, originally was a book, in the old Romish churches, containing the lessons to be read in divine service. Hence also the lives of saints and martyrs came to be called legends, as chapters were read out of them at Mattins, &c. But the word is now come into disrepute, as the Romish legends, particularly that of J. de Voragine, is full of ridiculous and romantick accounts.

LEGEND, also denotes the letters engraved about the margin of coins, or the inscriptions on medals which serve to explain the figures thereon. Strictly speaking, the legend differs from the inscription; this last properly signifying words placed on the reverse of a medal, in lieu of figures.

LEGION, a body of forces whereof the Roman armies chiefly consisted. Their standard at first was a wolf; afterwards a hog; sometimes a minotaur, a horse, a boar, &c. According to Pliny, Marius was the first who changed all these standards into eagles.

LEGISLATOR, a law-giver, or person who establishes the polity and laws of a state. Such was Moses, among the Jews; Lycurgus, among the Lacedæmonians, &c. With us, the legislative power is lodged in the king, lords, and commons assembled in parliament.

LEGUME, *Legumen*, among botanists, denotes a pericarpium of an oblong compressed figure, formed of two valves, joined by a visible suture both on the upper and under parts, and having the seeds affixed to the upper limbs of the two valves, in an alternate order.

LEGUMINOUS, an appellation given to all plants whose fruit is a legume.

LEMMA, in mathematicks, signifies a proposition, which serves previously to prepare the way for the more easily apprehending the demonstration of some theorem, or construction of some problem.

LEMNIAN EARTH, a species of earth or bole brought from Lemnos, an island of the Archipelago.

This earth, when genuine, is a good medicine in dysenteries, erasions of the intestines, hæmorrhages of the intestines, seminal weaknesses, and the fluor albus.

LEMON, *Limon*, in botany, a genus of trees with large stiff leaves like the citron, without any appendage at the bottom; the flower consists of many leaves, which expand in form of a rose: the fruit is almost of an oval figure, and divided into several cells, in which are lodged hard seeds surrounded by a thick fleshy substance, which, for the most part, is full of an acid juice. All sorts are propagated by budding or inarching them either on stocks of lemons or citrons produced from seeds, but they will not readily unite on orange stocks; for which reason the citrons are preferable to either oranges or lemons for stocks, as they readily join with either sort; and being of larger growth, cause the buds of the other sorts to be much stronger than if they were on stocks of their own kind.

The culture of the lemon is the same with that of the orange-tree, with this difference only, the former being hardier than the latter, will consequently bring their fruit to maturity with us much better than the orange will, and therefore require to have a greater share of fresh air in winter; for which reason they should always be placed nearer to the doors or windows of the green-house: and in some curious gardens these trees have been planted against walls, where, by covering them with glasses in winter, and protecting them from severe frost, they have produced plenty of large fruit: as these trees do generally produce stronger shoots, so they require more water to be given them than the orange; but as to the tender sorts, they must be treated with a little more care, otherwise their fruit will fall off in winter, and come to nothing. See ORANGE.

LEMONADE, a liquor prepared of water, sugar, and lemon or citron-juice: it is very cooling and grateful.

LENITIVE Medicines, among phyſicians, thoſe of a mild, ſoftening, and relaxing nature, and deſtitute of all acrimony.

LENS, in dioptricks, a ſmall oblong glaſs like a lentil; it is a medium terminated on one ſide by a ſpherical ſurface, on the other by a ſurface either plain or ſpherical. And of theſe there are five ſorts. The firſt, as A (*plate* XLVI. *fig.* 10.) is plain on one ſide, and convex on the other; the ſecond B convex on both ſides; the third plain on one ſide and concave on the other, as C; the fourth D concave on both ſides; the fifth convex on one ſide and concave on the other, as E, which is by ſome called a meniſcus.

The axis of a lens is a line paſſing perpendicularly through both its ſurfaces: thus the line F G is an axis common to all the five.

Lenſes are diſtinguiſhed into two general kinds, convex and concave: the firſt and ſecond lenſes are conſidered as convex; the third and fourth as concave: the laſt, if its convexity is greater than its concavity, is looked upon as convex; if on the contrary, it is conſidered as concave.

A lens is always ſuppoſed to conſiſt of a medium denſer than the circumambient one, unleſs where the contrary is expreſſed. When parallel rays fall upon the ſurface of a convex lens, they are refracted towards each other in paſſing through it, and thereby collected to a focus on the other ſide.

To explain this let us trace the progreſs of a ray as A B (*fig.* 11.) through the convex lens C D E H, whoſe axis is I K. Let L be the centre of the firſt convexity C D E, and M that of the other C H E: and let this ray A B be parallel to the axis; through B draw the line L N, which will be perpendicular to the ſurface C D E at that point. The ray A B in entering the denſer ſubſtance of the lens will be refracted towards the perpendicular, and, therefore, proceed, after it has entered the ſurface at B, in ſome direction inclined towards the axis, as B P. Through M, the centre of convexity of this ſurface, and the point P, draw the line M R, which paſſing through the centre will be perpendicular to the ſurface at P, and the ray now entering a rarer medium will be refracted from the perpendicular into ſome direction as P F. In like manner and for the ſame reaſons, the parallel ray S T on the other ſide the axis, and alſo all the intermediate ones as X Z, &c. will meet in the ſame point, unleſs the rays A B and S T enter the ſurface of the lens at too great a diſtance from the axis I F, for the reaſon of which ſee Refraction.

The point F where the parallel rays A B, S F, &c. are ſuppoſed to be collected by paſſing through the lens C E, is called the focus of parallel rays of that lens.

If the rays converge before they enter the lens, they are then collected at a point nearer to the lens than the focus of parallel rays. If they diverge before they enter the lens, they are then collected in a point beyond F; unleſs they proceed from a point on the other ſide at the ſame diſtance with the focus of parallel rays, in which caſe they are rendered parallel. If they proceed from a point nearer than that, they diverge afterwards, but in a leſs degree than before they entered the lens.

If the lens is plain on one ſide and convex on the other, the rays are refracted the ſame way, but in a leſs degree.

Had the rays A B, S T, proceeded from a radiant point on one ſide the lens, and been collected in a focus on the other; then if they ſhould be ſuppoſed to proceed from that focal point as from a radiant, and paſs through the lens the contrary way, they would be collected in that point which was the radiant in the other caſe: and the nearer the radiant point is to the lens, the further is the focus from it on the other ſide, and vice verſa.

If the rays A B, C D, E F, &c. (*fig.* 12.) be parallel to each other, but oblique to G H, the axis of the lens I K, or of the diverging rays C B, C F, proceed as from ſome point C which is not ſituated in the axis of the lens, they will be collected into ſome point as L, not directly oppoſite to the radiant C, but nearly ſo: for the ray C D which paſſes through M, the middle of the lens, and falls upon the ſurface of it with ſome obliquity, will itſelf ſuffer a refraction at D and N; but then it will be refracted the contrary way in one place to what it is in the other, and theſe refractions will be equal in degree, if the lens has an equal convexity on each ſide, as we may eaſily perceive, if we imagine N D to be a ray paſſing out of the lens both at N and D; for it is evident that the line N D has an equal inclination to each ſurface at both its extremities. Upon which account the difference between the ſituation of the point L and one directly oppoſite to C is ſo ſmall, that it is generally neglected; and the focus is ſuppoſed to be in that line, which a ray, that would paſs through the middle point of the lens, were it to ſuffer no refraction, would proceed in.

All which is ſufficiently clear, from what is ſaid under the article Refraction.

When parallel rays fall upon a concave lens, they are refracted from each other in paſſing through it, and thereby made to diverge, proceeding as from an imaginary focus on the firſt ſide of the lens.

In order to comprehend this, let A B C D (*plate* XLVI. *fig.* 13.) repreſent a concave lens, E F its axis, G H the radius of the firſt concavity, I K that of the ſecond; produce G H to L, and let M G be a ray of light entering the lens at the point G. This ray, being refracted towards the perpendicular G L, will paſs on to ſome point as K in the other ſurface more diſtant from the axis than G, and being there refracted from the perpendicular I K, will be diverted further ſtill from the axis, and proceed in the direction K N as from ſome point as O on the firſt ſide of the lens. In like manner other rays as P Q, parallel to the former, will proceed after refraction at both ſurfaces as from the ſame point O; which upon that account will be the imaginary focus of parallel rays of this lens.

If the rays diverge before they enter the lens, their imaginary focus is then nearer the lens than that of the parallel rays. If they converge before they enter the lens, proceeding towards ſome diſtant point in the axis as F, they are then rendered leſs converging; if they converge to a point at the ſame diſtance from the lens with the focus of parallel rays, they then go out parallel; if to a point at leſs diſtance, they remain converging, but in a leſs degree than before they entered the lens.

When the rays enter the lens diverging, the nearer their radiant point is to it, the nearer alſo is their imaginary focus after refraction, and vice verſa.

If the lens is plain on one ſide and concave on the other, the rays ſuffer a like refraction in each caſe, but in a leſs degree.

The truth of what has been ſaid concerning the paſſage of rays through a concave lens, is eaſily to be deduced from the laws of refraction.

But the method of determining the exact focal diſtance of lenſes is to be had from the propoſitions laid down and demonſtrated in the article Refraction. Thus the progreſs of the rays, after their refraction at the firſt ſurface where they enter a lens, is had by one of thoſe which determines the focal diſtance of rays entering a denſer medium of ſuch form: and their progreſs, after their refraction at the other ſurface where they go out, is had by computing what progreſs rays, moving in the direction they are found to have after their entrance at the firſt ſurface, will acquire by being refracted at the other; which is to be effected by one who determines the focal diſtance of rays paſſing out of a denſer medium of like form with that of the lens.

When a ray paſſes through a medium terminated by two plain and parallel ſurfaces, it is refracted one way in going out of the ſecond, as much as it was the other in entering the firſt; and, therefore, proceeds afterwards, not in the ſame direction, but in one which is parallel to that which it had before.

Thus, if the ray A B (*fig.* 14.) enters the denſer medium C D E F terminated by the parallel ſurfaces C D and E F, it is refracted at B towards the perpendicular B I, proceeding to a point at G, where it is as much refracted from the perpendicular G K in going out, and proceeds in the direction G H, not the ſame, but parallel to the former A B L.

LENT, a ſolemn time of faſting in the Chriſtian church, obſerved as a time of humiliation before Eaſter, the great feſtival of our Saviour's reſurrection.

LENTISCUS, the lentiſk or maſtich-tree, in botany, a genus of trees, very nearly allied to the terebinthus, or turpentine-tree, in its characters, but differing in that the leaves are pinnated; but there is no ſingle

leaf

leaf to terminate the end of each compound one. See Mastich.

LEO, the lion, in zoology. See Lion.

Leo, in astronomy, one of the 12 signs of the zodiack, the fifth in order, containing, according to Ptolemy, 32 stars; according to Tycho, 37; and according to Flamstead, 94. (See *plate* IV. *fig.* 5.)

The famous star of the first magnitude, called basilicus, regulus, cor leonis, or the lion's heart, is in this constellation.

LEONINE Verses, such as rhyme at every hemistich, the middle syllable of each verse corresponding with the last one.

LEONTICE, in botany, a genus of plants whose flower consists of six oval acute petals, with six slender filaments topped with erect antheræ: the fruit is a large inflated berry, with one cell, containing few globular seeds.

LEONTODON, in botany. See Dandelion.

LEONURUS, lion's-tail, in botany, a genus of plants whose flower is monopetalous and ringent, with four stamina, two of which are longer than the others: there is no pericarpium; but the seeds, which are oblong and angular, are contained in the bottom of the cup.

LEOPARD, a beast of prey, with the spots on the upper part of the body, round, and the lower ones variegated. It is a very nimble, as well as fierce animal, so that scarce any thing escapes it. Authors call the male pardus, and the female panthera.

LEPIDIUM, *dittander*, in botany, a genus of plants whose flower is tetrapetalous and cruciform, with six subulated stamina: the fruit is a compressed spear-shaped pod, containing oblong seeds. The common dittander, which grows wild in many places in England, has a very hot acrid taste, like pepper; it is said to incide gross humours opening obstructions of the liver and spleen, and is accounted a great antiscorbutick: when the leaves are eaten in the morning fasting, they excite the appetite and help digestion. Some affirm, that the powder of the dried leaves, given in wine to half an ounce, in a morning, fasting, is excellent in the dropsy.

LEPIDOPTERA, in zoology, an order of insects, with four wings, which are covered with imbricated squamulæ: add to this, that the mouth is commonly spiral. Under this order are comprehended the butterflies and phalenæ, or moths.

LEPROSY, *Lepra*, a foul cutaneous disease, appearing in dry, white, thin, scurfy scabs, either on the whole body, or only some part of it, and usually attended by a violent itching, and other pains.

In the method of cure, says Hoffman, we should endeavour to discharge out of the body the mass of corrupt, glutinous and acrid humours, by sufficient bleeding, and abstinence, by purges, as well gentle as drastick, then by proper aliment, and a good regimen, promote the generation of wholesome juices; and likewise by external, detersive, consolidating and drying remedies, to free the part from pain, tumours, itching, and ulcers. The purges may consist of the root and the resin of jalap, the extract of black hellebore, elaterium mixed with calomel, or ethiops-mineral, and gum ammoniack. Among those things which stimulate the parts to an excretory motion, and more powerfully melt down the tenacious humours, the wood and bark of guaiacum exceed all others: the most considerable besides these, are the tartarized and acrid tincture of antimony, sulphur of antimony, cinnabar, and if a venereal taint is suspected, a decoction of crude antimony; which medicines in a convenient dose in the morning, with purifying decoctions drank in bed, afford great relief. But if these fail, recourse must be had to mercury, which some, after extinction, mix with flowers of sulphur and camphire, and rub it on the joints to promote a salivation. Others more properly give mercurius dulcis, with double the quantity of crabs-eyes, and calx of antimony, rising gradually from three or four grains, to a scruple, in order to salivate with proper precautions.

LEPUS, the Hare, in zoology. See Hare.

Lepus, in astronomy, a constellation of the southern hemisphere; comprehending 12 stars, according to Ptolemy; 13, according to Tycho; and 19, in the Britannick catalogue.

LETHARGY, *Lethargus*, in physick, a kind of disorder, wherein the person affected labours under a heavy and perpetual sleep, with scarce any interval of waking. There are several species of this disorder; the chief are coma vigil, coma somnolentum, carus, and a lethargy. See Coma, Carus, &c.

LETHE, in the ancient mythology, one of the rivers of hell, signifying oblivion or forgetfulness; its waters having, according to poetical fiction, the peculiar quality of making those who drank them entirely forget every thing that was past.

LETTER, a character used to express one of the simple sounds of the voice; and as the different simple sounds are expressed by different letters, these, by being differently compounded, become the visible signs or characters of all the modulations and mixtures of sounds used to express our ideas in a regular language. Thus, as by the help of speech, we render our ideas audible; by the assistance of letters we render them visible, and by their help we can wrap up our thoughts, and send them to the most distant parts of the earth, and read the transactions of different ages.

As to the first letters, what they were, who first invented them, and among what people they were first in use, there is still room to doubt: Philo attributes this great and noble invent[illegible]am, J[illegible] Irenæus, and others, to Enoch; Bibliander, to Adam; Eusebius, Clemens Alexandrinus, Cornelius Agrippa, and others, to Moses; [illegible] Rufus Festus, Pliny, Lucan, &c. to the Phœnicians; St. Cyprian, to Saturn; Tacitus, to the Egyptians; some, to the Ethiopians; and others, to the Chinese: but, with respect to these last, they can never be intitled to this honour, since all their characters are the signs of words, formed without the use of letters: which renders it impossible to read and write their language, without a vast expence of time and trouble; and absolutely impossible to print it by the help of types, or any other manner by the engraving, or cutting in wood. See Printing.

There have also been various conjectures about the different kinds of letters used in different languages; thus, according to Crintus, Moses invented the Hebrew letters; Abraham, the Syriack and Chaldee; the Phœnicians, those of Attica, brought into Greece by Cadmus, and from thence into Italy, by the Pelasgians; Nicostrata, the Roman; Isis, the Egyptian; and Vulfilas, those of the Goths.

It is probable that the Egyptian hieroglyphicks were the first manner of writing: but whether Cadmus and the Phœnicians learned the use of letters from the Egyptians, or from their neighbours of Judæ or Samaria, is a question; for since some of the books of the Old Testament were then written, they are more likely to have given them the hint, than the hieroglyphicks of Egypt. But wheresoever the Phœnicians learned this art, it is generally agreed, that Cadmus, the son of Agenor, first brought letters into Greece; whence, in following ages, they spread over the rest of Europe.

Letters make the first part or elements of grammar; an assemblage of these compose syllables and words, and these compose sentences. The alphabet of every language consists of a number of letters, which ought each to have a different sound, figure, and use. As the difference of articulate sounds was intended to express the different ideas of the mind, so one letter was originally intended to signify only one sound, and not, as at present, to express sometimes one sound and sometimes another; which practice has brought a great deal of confusion into the languages, and rendered the learning of the modern tongues much more difficult than it would otherwise have been. This consideration, together with the deficiency of all the known alphabets, from their wanting some letters to express certain sounds, has occasioned several attempts towards an universal alphabet, to contain an enumeration of all such single sounds or letters, as are used in any language. See Alphabet.

Grammarians distinguish letters into vowels, consonants, mutes, liquids, dipthongs, and characteristicks. They are also divided into labial, dental, guttural, and palatal, and into capital and small letters. They are also denominated from the shape and turn of letters; and in writing are distinguished into different hands, as round-text, german-text, round-hand, italian, &c. and in printing, into roman, italick, and black letters. The

term letter, or type, among printers, not only includes the capitals, small-capitals, and small letters, but all the points, figures, and other marks, cast and used in printing; and also the large ornamental letters, cut in wood or metal, which take place of the illumined letters used in manuscripts. The letters used in printing are cast at the ends of small pieces of metal, about three quarters of an inch in length; and the letter being not indented, but raised, easily gives the impression, when after being blacked with a glutinous ink, paper is closely pressed upon it. See TYPE.

A fount of letters includes small letters, capitals, small capitals, points, figures, spaces, &c. but besides these they have different kinds of two-lined letters, only used for titles, and the beginning of books, chapters, &c.

LETTER *Foundery, or the Casting of* LETTERS. The first thing requisite is to prepare good steel punches, on the face of which is drawn the exact shape of the letter with pen and ink, if the letter be large, or with a smooth blunted point of a needle, if small; and then, with proper gravers, the cutter digs deep between the strokes, letting the marks stand on the punch, the work of hollowing being generally regulated by the depth of the counter-punch. Then he files the outside till it is fit for the matrice.

LETTER *of Attorney*, in law, is a writing by which one person authorises another to do some lawful act in his stead, as to give seisin of lands, to receive debts, sue a third person, &c.

The nature of this instrument is to transfer to the person to whom it is given, the whole power of the maker, to enable him to accomplish the act intended to be performed. It is either general or special, and sometimes it is made revocable, which is when a bare authority is only given; and sometimes it is irrevocable, as where debts, &c. are assigned from one person to another. It is generally held, that the power granted to the attorney must be strictly pursued; and that where it is made to three persons, two cannot execute it. No letter of attorney made by any seaman, &c. in any ship of war, or having letters of marque, or by their executors, &c. in order to empower any person to receive any share of prizes, or bounty-money, shall be valid, unless the same be made revocable, and for the use of such seamen, and be signed and executed before, and attested by the captain and one other of the signing officers of the ship, or the mayor or chief magistrate of some corporation.

LETTERS-CLAUSE, or CLOSE-LETTERS, are opposed to letters patent, because they are commonly sealed up with the king's signet or privy-seal, while letters-patent are left open.

LETTERS *of Credit*, among merchants, is a letter wrote by a merchant or banker, to his correspondent abroad, requesting him to credit the bearer as far as a certain sum. See CREDIT.

LETTER *of Licence*, an instrument of writing granted by a person's creditors, allowing him a certain time for the payment of his debts; by which means he is enabled to prosecute his business, without fearing an arrest.

LETTER *of Mart*, or *Marque*, a letter granted to one of the king's subjects, under the privy seal, empowering him to make reprisals for what was formerly taken from him by the subjects of another state, contrary to the law of mart. See MARQUE.

Monitory LETTERS. See MONITORY.

LETTERS-PATENT, or OVERT, are writings sealed with the great seal of England; so called, because they are open with the seal affixed to them. These are granted to authorise a man to do or enjoy what of himself he could not do. See PATENT.

Pacifick LETTERS, *Literæ pacificæ*, in church-history, testimonial letters given by the bishop, or chorepiscopus, to their priests, when they had occasion to travel abroad, certifying that the bearer was a catholick, and in communion with the church.

Paschal LETTER, a letter written by the pope to all metropolitans, to inform them on what day Easter was to be celebrated.

LETTUCE, *Lactuca*, in botany, a well known genus of plants, the flower of which is compound and imbricated, containing a number of hermaphrodite corollulæ, which are monopetalous, ligulated, and truncated, and indented at the end in four or five parts: the seeds are oblong, acuminated, and crowned with down, and placed in the cup.

There are several sorts of lettuce cultivated in gardens for culinary purposes, as the cabbage-lettuce, brown Dutch, imperial, white cos, black cos, green cos, &c. They are all sown at different seasons of the year, whereby there is a continual supply; but the most esteemed sort is the cos: these should be protected in winter with glasses, otherwise they are liable to be destroyed in very wet or frosty weather. In March they may be transplanted in the open ground, where they may remain till they are cabbaged, and then they are fit for use; but if they are not inclinable to turn in, they should be tied round their tops with bass, &c. which will blanch and make them tender.

Lettuces, in general, are easy of digestion, they abate the acrimony of the humours, and quench thirst; for which reason they are frequently used in summer season: many take them to be anodyne, and to procure sleep, which is done, not by any narcotick quality, but by relaxing the fibres and temperating the heat of the viscera; they are good in dry constitutions, and help those that are costive.

LEVARI FACIAS, is a writ directed to the sheriff for levying a certain sum of money upon the lands, &c. of a person who has forfeited his recognizance.

LEVATOR, in anatomy, a name applied to several muscles in the body, that serve to raise the parts to which they belong. See ELEVATOR.

LEVATOR *Scapulæ proprius*, in anatomy, or rather, according to Winslow, *angularis*, is a long, and pretty thick muscle, about two fingers in breadth, lying above the superior angle of the scapula, along the posterior lateral part of the neck of that bone.

LEVEL, an instrument to draw a line parallel to the horizon, whereby the difference of ascent or descent between several places may be found, for conveying water, draining fens, &c. The word is derived from the Latin, *libella*, the cross beam in a balance, which, to be just, must stand exactly horizontal.

Air LEVEL, that which shews the line of level by means of a bubble of air inclosed with some liquor in a glass tube, whose two edges are sealed hermetically. When the bubble fixes at a mark made exactly in the middle of the tube, the plane where it is fixed is level; otherwise the bubble will rise to one end. The liquor with which the tube is filled is oil of tartar, or aqua-secunda; these not being liable to freeze.

Air LEVEL, with sights, is about eight inches long, and seven or eight in diameter, set in a brass tube, with an aperture in the middle, (*plate* XLVII. *fig.* 3. The tubes are carried in a strong straight ruler, a foot long, at whose ends are fixed two lights exactly perpendicular to the tubes, and of an equal height, having a square hole, formed by two filets of brass, crossing each other at right angles, in the middle of which is drilled a very little hole, through which a point on a level with the instrument is descried.

The brass tube is fastened on the ruler by means of two screws; one of which, marked 4, serves to raise or depress the tube at pleasure, to bring it to a level. The top of the ball and socket is rivetted to a little ruler that springs, one end of which is fastened with screws to the greater ruler, and the other end has a screw 5, serving to raise or depress the instrument when nearly level.

The following is a more commodious instrument.

Air LEVEL, with telescope sights; this level (*fig.* 4.) only differs from the last, in that, instead of plain sights, it carries a telescope. This was invented by M. Huygens; which has this advantage, that it may be inverted by turning the rule and telescope half round; and then, if the hair cut the same point that it did before the turn, it is a proof the operation is just. It may be observed, that one may add a telescope to any kind of level, by applying it upon a parallel to the base or ruler, when there is occasion to take the level of remote objects.

Dr. Desaguliers contrived an instrument, by which the difference of level of two places, which could not be taken in less than four or five days with the best telescope-levels, may be taken in as few hours. The instrument is as follows: to the ball C (*fig.* 7.) is joined a recurve tube B A, with a very fine bore, and a small bubble at top,

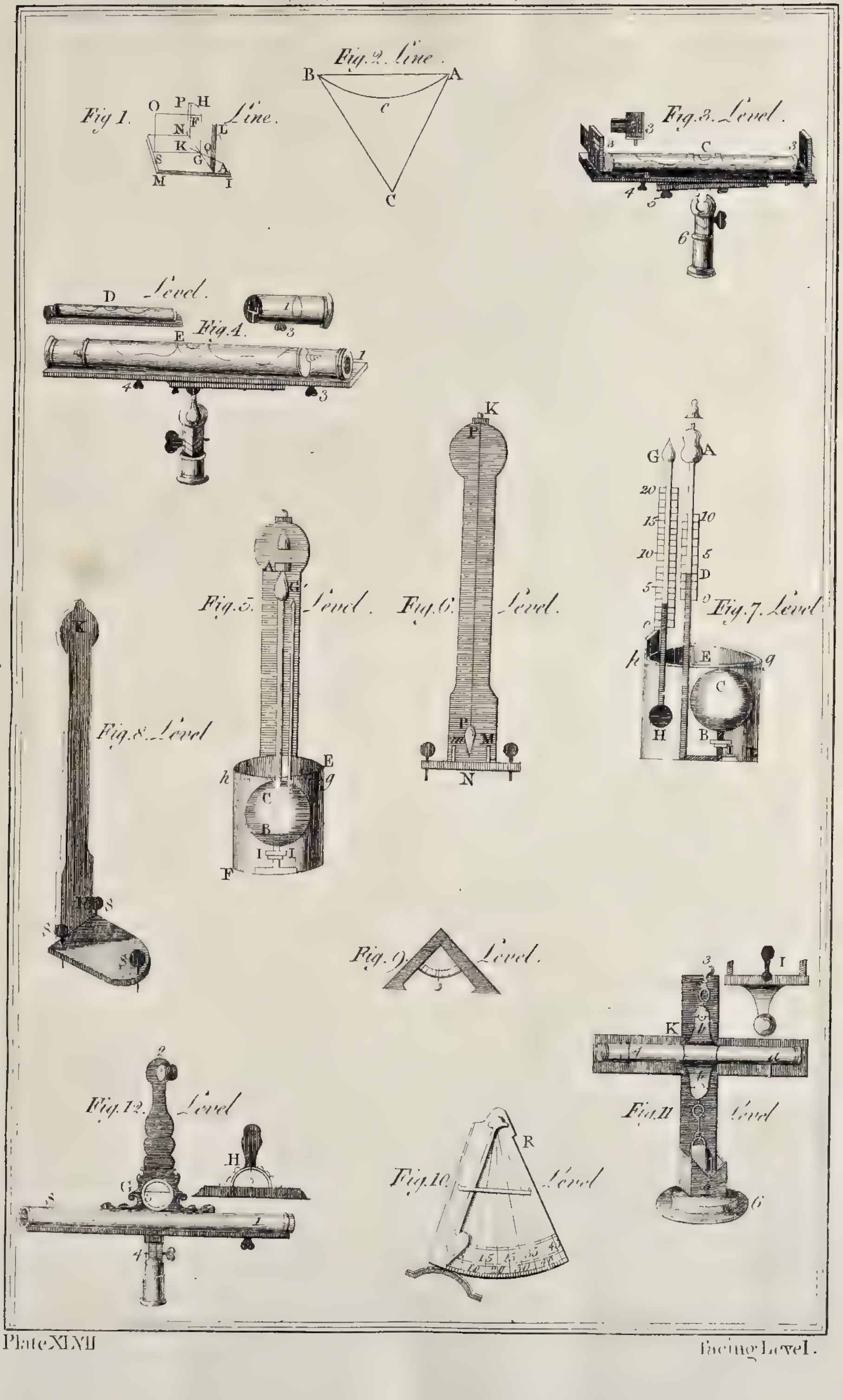


Fig 1. Line.
Fig. 2. Line.
Fig. 3. Level.
Level. Fig. 4.
Fig. 5. Level.
Fig. 6. Level.
Fig. 7. Level
Fig. 8. Level
Fig. 9. Level.
Fig. 10. Level
Fig. 11 Level
Fig. 12. Level

top, A, whose upper part is open. It is evident from the make of this instrument, that if it be inclined in carrying, no prejudice will be done to the liquor, which will always be right both in the ball and tube, when the instrument is set upright. If the air at C, be so expanded with heat, as to drive the liquor to the top of the tube, the cavity A will receive the liquor, which will come down again and settle at D, or near it, according to the level of the place where the instrument is, as soon as the air at C returns to the same temperament as to heat and cold. To preserve the same degree of heat, when the different observations are made, the machine is fixed in a tin vessel F E, filled with water up to *g h*, above the ball, and a very sensible thermometer has also its ball under water, that one may observe the liquor at D, in each experiment, when the thermometer stands at the same height as before. The water is poured out when the instrument is carried, which one may do conveniently by means of the wooden frame, which is set upright by three screws S, S, S, (*fig.* 8.) and a line and plummet K M. The back part of the wooden frame is represented by *fig.* 6. where from a piece at top K hangs the plummet P, over a brass point at N; M *m* are brackets, to make the upright board K N continue at right angles, with the horizontal one at N; *fig.* 5. represents a front view of the machine, supposing the fore-part of the tin-vessel transparent; and here the brass socket of the recurve-tube, into which the ball is screwed, has two wings at I I, fixed to the bottom, that the ball may not break the tube by its endeavour to emerge, when the water is poured in as high as *g h*.

After the Dr. had contrived this machine, he considered, that as the tube is of a very small bore, if the liquor should rise into the ball at A, in carrying the instrument from one place to another, some of it would adhere to the sides of the ball A, and upon its descent in making the experiment, so much might be left behind, that the liquor would not be high enough at D (*fig.* 7.) to shew the difference of the level; therefore, to prevent that inconvenience, he contrived a blank screw, to shut up the hole at A, as soon as one experiment is made, that in carrying the machine, the air in A may balance that in C, so that the liquor shall not run up and down the tube, whatever degree of heat and cold may act upon the instrument, in going from one place to another. Now because one experiment may be made in the morning, the water may be so cold, that when a second experiment is made at noon, the water cannot be brought to the same degree of cold it had in the morning; therefore, in making the first experiment, warm water must be mixed with the cold, and when the water has stood some time before it comes to be as cold as it is likely to be at the warmest part of that day, observe and set down the degree of the thermometer at which the spirit stands, and likewise the degree of the water in the barometer at D; then screw on the cap at A, pour out the water, and carry the instrument to the place whose level you would know; then pour in your water, and when the thermometer is come to the same degree as before, open the screw at top, and observe the liquor in the barometer.

The doctor's scale for the barometer is ten inches long, and divided into tenths; so that such an instrument will serve for any heights not exceeding ten feet, each tenth of an inch answering to a foot in height.

The Dr. made no allowance for the decrease of density in the air, because he did not propose this machine for measuring mountains, (though with a proper allowance for the decreasing density of the air, it will do very well) but for heights that want to be known in gardens, plantations, and the conveyance of water; where an experiment that answers two or three feet in a distance of 20 miles, will render this a very useful instrument.

Artillery-Foot LEVEL, in gunnery, is in form of a square, having its two legs or branches of an equal length, at a juncture whereof is a little hole, whence hangs a thread and plummet, playing on a perpendicular line in the middle of a quadrant. It is divided into twice 45 degrees from the middle. (*Plate* XLVII. *fig.* 9.)

This instrument may be used on other occasions, by placing the ends of its two branches on a plane; for when the thread plays perpendicularly over the middle division of the quadrant, that plane is assuredly level. To use it in gunnery, place the two ends on the piece of artillery, which you may raise to any proposed height, by means of the plummet, whose thread will give the degree above the level.

Carpenter's and Paviour's LEVEL, consists of a long ruler, in the middle whereof is fitted, at right angles, another somewhat bigger, at the top of which is fastened a line, which, when it hangs over a fiducial line at right angles with the base, shews that the said base is horizontal. Sometimes this level is all of one board.

Gunner's LEVEL, for levelling cannons and mortars, consists of a triangular brass-plate, about four inches high, (*fig.* 10.) at the bottom of which is a portion of a circle, divided into 45 degrees, which number is sufficient for the highest elevation of cannons and mortars, and for giving shot the greatest range: on the centre of this segment of a circle is screwed a piece of brass, by means of which it may be fixed or screwed at pleasure; the end of this piece of brass is made so as to serve for a plummet and index, in order to shew the different degrees of elevation of pieces of artillery. This instrument has also a brass-foot, to set upon cannons or mortars, so as when those pieces are horizontal, the instrument will be perpendicular. The foot of this instrument is to be placed on the piece to be elevated, in such a manner, as that the point of the plummet may fall on the proper degree: this is what they call levelling the piece.

Mason's LEVEL, is composed of three rules, so joined as to form an isosceles-rectangle, somewhat like a Roman A, at the vertex whereof is fastened a thread, from which hangs a plummet, that passes over a fiducial line, marked in the middle of the base, when the thing, to which the level is applied, is horizontal; but declines from the mark, when the thing is lower on one side than on the other.

Plumb or *Pendulum* LEVEL, that which shews the horizontal lines by means of another line perpendicular to that described by a plummet or pendulum. This instrument, (*fig.* 12.) consists of two legs or branches, joined together at right angles, whereof that which carries the thread and plummet is about a foot and a half long; the thread is hung towards the top of the branch, at the point 2, the middle of the branch where the thread passes is hollow, so that it may hang free every where; but towards the bottom, where there is a little blade of silver, whereon is drawn a line perpendicular to the telescope, the said cavity is covered by two pieces of brass, making as it were a kind of case, lest the wind should agitate the thread, for which reason the silver-blade is covered with a glass G, to the end that it may be seen when the thread and plummet play upon the perpendicular: the telescope is fastened to the other branch of the instrument, and is about two feet long; having an hair placed horizontally across the focus of the object-glass, which determines the point of the level. The telescope must be fitted at right angles to the perpendicular. It has a ball and socket by which it is fastened to the foot, and was invented by Mr. Picard.

Reflecting LEVEL, that made by means of a pretty long surface of water, representing the same object inverted which we see erected by the eye, so that the point where these two objects appear to meet, is a level with the place where the surface of the water is found. This is the invention of M. Mariotte.

There is another reflecting level, consisting of a mirror of steel, or the like, well polished, and placed a little before the object-glass of a telescope, suspended perpendicularly. This mirror must make an angle of 45° with the telescope, in which case the perpendicular line of the said telescope is converted into a horizontal line, which is the same with the line of level. This is the invention of M. Cassini.

Water-LEVEL, that which shews the horizontal line by means of a surface of water or other liquor, founded on this principle, that water always places itself level. See FLUID.

The most simple is made of a long wooden trough, or canal, whose sides are parallel to the base, so that being equally filled with water, its surface shews the line of level. This is the chorobates of the ancients.

It is also made with two cups fitted to the two ends of a pipe, three or four feet long, about an inch in diameter, by means whereof the water communicates from the one to the other cup; and this pipe being moveable on its

its ſtand by means of a ball and ſocket, when the two cups become equally full of water, their two ſurfaces mark the line of level.

This inſtrument, inſtead of cups, may alſo be made with two ſhort cylinders of glaſs three or four inches long, faſtened to each extreme of the pipe, with wax or maſtick. Into the pipe is poured ſome common or coloured water, which ſhews itſelf through the cylinders, by means whereof the line of level is determined; the height of the water, with reſpect to the centre of the earth, being always the ſame in both cylinders: this level, though very ſimple, is yet very commodious for levelling ſmall diſtances.

Level *of Mr. Huygens's Invention*, conſiſts of a teleſcope *a*, (*fig.* 11.) in form of a cylinder going through a ferril, in which it is faſtened by the middle. This ferril has two flat branches *b b*, one above, and the other below, at the ends whereof are faſtened little moving pieces which carry two rings, by one of which the teleſcope is ſuſpended to an hook at the end of the ſcrew 3, and at the lower *b* a pretty heavy weight is ſuſpended, in order to keep the teleſcope in equilibrio. This weight hangs in the box 5, which is almoſt filled with linſeed-oil, oil of walnuts, or other matter that will not eaſily coagulate, for more aptly ſettling the balance of the weight and teleſcope. The inſtrument carries two teleſcopes cloſe and very parallel to each other; the eye-glaſs of the one being againſt the object-glaſs of the other, that one may ſee each way without turning the level. In the focus of the object-glaſs of each teleſcope muſt a little hair be ſtrained horizontally, to be raiſed and lowered by a little ſcrew. If the tube of the teleſcope be not level, when ſuſpended, a ferril, or ring 4, is put on, to be ſlid along till it be level. The hook on which the inſtrument is hung, is fixed to a flat wooden croſs; at the end of each arm is a hook to keep the teleſcope ſteady: to the flat croſs is applied another hollow one that ſerves as a caſe for the inſtrument; but the two ends are open, that the teleſcope may be ſecured from the weather, and always ready for uſe. The foot of the inſtrument is a round braſs plate, to which are faſtened three braſs ferrils, moveable by means of joints, wherein are ſtaves; and on this foot is placed the box.

LEVELLING, the finding a line parallel to the horizon at one or more ſtations, and ſo to determine the height of one place with regard to another.

A truly level ſurface is a ſegment of any ſpherical ſurface which is concentrick to the globe of the earth. A true line of level is an arch of a great circle which is imagined to be deſcribed upon a truly level ſurface.

The apparent level is a ſtraight line drawn tangent to an arch or line of true level. Every point of the apparent level, except the point of contact, is higher than the true level: thus (*plate* XLIX. *fig.* 1.) let E A G be an arch of a great circle drawn upon the earth; to a perſon who ſtands upon the earth at A, the line H D is the apparent level, parallel to his rational horizon R R; but this line, the further it is extended from his ſtation A, the further it recedes from the centre; for B C is longer than A C, and D C is longer than B C, &c.

The common methods of levelling are ſufficient for laying pavements of walks, for conveying water to ſmall diſtances, for placing horizontal dials, or aſtronomical inſtruments: but, in levelling the bottoms of canals which are to convey water to the diſtance of many miles, the difference between the apparent and true level muſt be taken into the account; thus (*fig.* 2.) let I A L be an arch of a great circle upon the earth; let it be required to cut a canal, whoſe bottom ſhall be a true level from A to B, of the length of 5078 feet; the common method is to place the levelling inſtrument in the bottom of the canal at A, and, looking through the ſights placed horizontally at a ſtick ſet up perpendicular at B, to make a mark where the viſual ray or line of the apparent level points as E, and then to ſink the bottom of the canal at B, as much below E as A is below D: but this will not give us a true level; for, according to Caſſini's calculation, at the diſtance of 5078 feet, the apparent level is ſeven inches above the true; and, therefore, to make a true level, B muſt be ſunk ſeven inches lower than the apparent level directs; ſo that, if A be four feet below D, B muſt be four feet ſeven inches below the mark E. We have here mentioned the error which will ariſe from placing the level at one end of the line to be levelled, and ſhewn how to correct it; but in moſt caſes it is better to take a ſtation in the middle of the line to be levelled; thus, if the points H and B are to be levelled, place the inſtrument in the middle at A, and, ſetting up ſticks perpendicular at H and B, make marks upon each ſtick where the apparent level points, as E and F: thoſe points are level; and, if you ſink H as much below F as B is below E, H A B will be a true level. When the bottom of a canal is thus truly level, if water be let in at one end, it will riſe to the ſame height at the other. If water be required to run with any velocity, that is of another conſideration: a river will run, though very ſlowly, which hath not above ſix inches deſcent below the true level for a mile in length: if a river whoſe water is foul, be required to run with ſuch a velocity as to carry its foulneſs into the ſea, ſixteen inches, or at leaſt one foot fall below the true level, in a mile running, have been thought ſufficient, by perſons ſkilful in that affair. Vid. Riccioli Geogr. Reformat. l. 6. c. 24.

This we thought neceſſary to premiſe, before we explained the method uſed in levelling, which is as follows: ſuppoſe the height of the point A (*plate* XLIX. *fig.* 5.) on the top of a mountain, above that of the point B at the foot thereof, be required. Place the level about the middle diſtance, between the two points, as in D, and ſtaffs in A and B; and let there be perſons inſtructed with ſignals for raiſing and lowering on the ſtaffs little marks of paſteboard, or any ſuch matter. The level being placed horizontally, &c. look towards the ſtaff A E, and cauſe the mark to be raiſed or lowered, till the middle, upper edge, or other moſt conſpicuous part, appear in the viſual ray. Then meaſuring exactly the perpendicular height of the point A above E, which ſuppoſe eight feet ſix inches, ſet that down in your book; then turn the level horizontally about, that the eye-glaſs of the teleſcope may be ſtill next the eye, when you look the other way; (if you have only plain ſights, the inſtrument need not be turned;) and cauſe the perſon at the ſtaff B to raiſe or lower his mark, till ſome conſpicuous part fall in the viſual ray, as at C: then meaſure the perpendicular of C above B, which ſuppoſe twenty feet eight inches; ſet this alſo down in the book above the other number; ſubtract the one from the other, the remainder will be twelve feet two inches, which is the difference of level between A and B, or the height of the point A above B.

If the point D, where the inſtrument is fixed, be in the middle between A and B, there will be no neceſſity for reducing the apparent level to the true; the viſual ray being then equally raiſed above the true level.

If it be further required to know whether there be a ſufficient deſcent for conveying water from the ſpring A to the point B (*fig.* 4.) here, as the diſtance from A to B is conſiderable, it is requiſite that ſeveral operations be made. Having then choſen a proper place for the firſt ſtation, as at I, ſet up a ſtaff in the point A, near the ſpring, with a proper mark to ſlide up and down the ſtaff, as L; and meaſure the diſtance from A to I, which ſuppoſe 2000 yards. Then, the level being adjuſted in the point K, let the mark L be raiſed and lowered till you ſpy ſome conſpicuous part through the teleſcope, or ſights, and meaſure the height A L, which ſuppoſe thirteen feet five inches. But, in regard the diſtance A I is 2000 yards, you muſt have recourſe to your table for reduction, ſubtracting eleven inches, which will leave the height A L twelve feet ſix inches; and this note down in your book. Now turn the level horizontally, ſo as the eye-glaſs of the teleſcope may be towards the ſtaff at A; and, fixing up another ſtaff at H, cauſe the mark G to be moved up and down, till you can ſpy ſome conſpicuous part: meaſure the height H G, which ſuppoſe ſix yards, four feet two inches: meaſure likewiſe the diſtance of the points I H, which ſuppoſe 1300 yards, for which diſtance, four inches eight lines muſt be ſubtracted from the height H G, which will leave but ſix yards, three feet, nine inches, four lines to be taken down in your book. This done, remove the level forwards to E, whence the ſtaff H may be viewed; as alſo another ſtaff at D: and proceed in every reſpect as before.

When a proper ſtation for the level has been pitched upon between the two points, the two heights obſerved at that ſtation muſt be written down in two columns, namely,

namely, under the firſt column thoſe obſerved, when the eye was from the ſpring, or towards the point, which may be called back-ſights; and under the ſecond column thoſe obſerved, when the eye was next the ſpring or the fore-ſights.

Having ſummed up the height of each column ſeparately, ſubtract the leſs from the greater, and the remainder will be the difference of level between A and B.

If the diſtance of the two points be required, add all the diſtances meaſured together, and, dividing the difference of height by the yards of the diſtances, for each 200 yards you will have a deſcent of about two inches nine lines.

Dr. Halley ſuggeſts a new method of levelling, which is performed wholly by the barometer, in which the mercury is found to be ſuſpended to ſo much the leſs height, as the place is further remote from the centre of the earth. Hence it follows, that the different height of the mercury in two places gives the difference of level.

Mr. Derham, from ſome obſervations at the top and bottom of the Monument in London, found that the mercury fell one tenth of an inch at every 82 feet of perpendicular aſcent, when the mercury was at 30 inches. Dr. Halley allows of one tenth of an inch for every 30 yards, which, conſidering how accurately barometers are now made, he thinks this method ſufficiently exact to take levels for the conveyance of water, and leſs liable to errors than the common levels.

He alſo found a difference of three inches eight tenths between the height of the mercury at the top and bottom of Snowden hill, in Wales.

For the common occaſions of levelling, ſet a pole upright in a ſpring, pond, &c. and mark how many feet and inches are above water: then ſet up another pole of equal length with the other, in the place to which the water is to come. Place the centre of a quadrant on the top of this laſt pole, the plummet hanging free; ſpy through the ſights the top of the pole in the water, and, if the thread cuts any degree of the quadrant, the water may be conveyed by a pipe laid in the earth. If you cannot ſee from one extreme to the other, the operation may be repeated.

Levelling *Staves*, inſtruments uſed in levelling that carry the marks to be obſerved, and at the ſame time meaſure the heights of thoſe marks from the ground. They uſually conſiſt of two long wooden ſquare rulers, that ſlide over one another, and divided into feet, inches, &c.

LEVER, in mechanicks, an inflexible line, rod or beam, moveable about or upon a fixed point, called the prop or fulcrum, upon one end of which is the weight to be raiſed; at the other end is the power applied to raiſe it, as the hand, &c.

Since the momentum of the weight and power are as the quantities of matter in each multiplied by their reſpective celerities: and the celerities are as the diſtances from the centre of motion, and alſo as the ſpaces paſſed through in a perpendicular direction in the ſame time; it muſt follow, that there will be an equilibrium between the weight and power, when they are to each other reciprocally as the diſtances from the centre, or as the celerities of the motions, or as the perpendicular aſcent or deſcent in the ſame time; and this univerſally in all mechanical powers whatſoever, which is therefore the fundamental principle of all mechanicks. See Mechanical *Powers*.

LEVERET, among ſportſmen, denotes a hare in the firſt year of her age.

LEVIGATION, in pharmacy and chymiſtry, the reducing hard bodies to an impalpable powder, by grinding them with water on porphyry or marble, &c.

LEVITE, in a general ſenſe, means all the deſcendants of Levi, among whom were the Jewiſh prieſts themſelves, who, being deſcended from Aaron, were likewiſe of the race of Levi: but it is more particularly uſed for an order of officers in that church, who were employed in performing the manual ſervice of the temple, ſuch as in fetching wood, water, and other things neceſſary for the ſacrifices; and in ſinging and playing upon inſtruments of muſick.

LEVITICUS, a canonical book of the Old Teſtament, ſo called from its containing the laws and regulations relating to the prieſts, Levites, and ſacrifices.

LEVITY, in phyſiology, the privation or want of weight in any body, when compared with another that is heavier than it, in which ſenſe it ſtands oppoſed to gravity. See Gravitation and Gravity.

LEVY, in law, ſignifies to gather or collect; as to levy money; and to levy a fine of lands, is the paſſing a fine.

LEX, law. See Law.

LEXICON, the ſame with dictionary. It is generally uſed in ſpeaking of Greek dictionaries.

LIBATION, a religious ceremony among the ancient pagans, which conſiſted in an effuſion of liquors poured on the head of the victims prepared for ſacrifice. Libations were alſo in uſe among the Hebrews, who poured a tun of wine on the victim after it was killed, and the ſeveral pieces of the ſacrifice were laid on the altar, ready to be conſumed in the flames.

LIBEL, injurious reproaches or accuſations againſt a perſon, written and publiſhed in order to expoſe him to publick contempt, hatred or ridicule.

Libel, in the law of Scotland, implies an indictment. See Indictment.

LIBELLA, or Libellula, in the hiſtory of inſects, a genus of four-winged flies, called in Engliſh dragon-flies, or adder-flies; the characters of which are, that they are furniſhed with jaws, the antennæ are ſhort, and the tail terminated by a kind of forceps.

LIBERATE, in law, a writ that lies for the payment of a penſion, or annual ſum; granted under the great ſeal, being directed to the treaſurer and chamberlains of the exchequer.

LIBERIA, in Roman antiquity, a feſtival obſerved on the ſixteenth of the calends of April, at which time the youth laid aſide their juvenile habit for the toga virilis, or habit peculiar to grown men. See Toga.

LIBERTUS, in Roman antiquity, a perſon who, from being a ſlave, had obtained his freedom.

LIBERTY, *Libertas*, in general, denotes a ſtate of freedom, in contradiſtinction to ſlavery. See Freedom.

According to Cicero, liberty is the power of living as a man pleaſes, or without being controlled by another.

In a legal ſenſe, liberty ſignifies ſome privilege that is held by charter or preſcription.

LIBRA, the balance, in aſtronomy, one of the twelve ſigns of the zodiack, the ſixth in order; ſo called, becauſe when the ſun enters it, the days and nights are equal, as if weighed in a balance. (See *plate* IV. *fig.* 6.)

Libra, in Roman antiquity, a pound weight; alſo a coin, equal in value to 20 denarii.

LIBRARY, an edifice, or apartment, deſtined for the placing of books; or the books themſelves lodged therein. The word is derived from the Latin *libraria*, which is derived from *liber*, a book.

LIBRATION, in aſtronomy, an apparent inequality in the motion of the moon, by which ſhe ſeems to librate or waver about her own axis, ſometimes from the eaſt to the weſt, and ſometimes from weſt to eaſt. See Moon.

Libration *of the Earth*, is that motion whereby the earth is ſo retained in its orbit, that its axis continues conſtantly parallel to the axis of the world.

LICENCE, in law, an authority given to a perſon to do ſome lawful act.

LICENTIATE, one who has obtained the degree of a licence.

LICHEN, *Cinereus Terreſtris*, aſh-coloured ground liver-wort, in botany, a ſpecies of moſs, conſiſting of roundiſh, pretty thick leaves, divided about the edges into obtuſe ſegments, flat above, of a reticular texture underneath, faſtened to the earth by ſmall fibres; when in perfection, of an aſh-grey colour; by age, turning darker coloured or rediſh. It grows on commons and open heaths, ſpreads quickly on the ground, and is to be met with at all times of the year, but is ſuppoſed to be in its greateſt vigour about the end of autumn. This herb, mixed with black pepper, is ſaid to be a warm diuretick, and is particularly celebrated as a preſervative againſt the terrible conſequences of the bite of a mad dog. This powder was afterwards inſerted, in the year 1721, into the London Pharmacopœia, at the deſire of Dr. Mead, who had large experience of its good effects, and who declares, that he had never known it to fail, where it had been uſed, with the aſſiſtance of cold bathing, before the hydrophobia began.

LICTORS,

LICTORS, *Lictores*, in Roman antiquity, the serjeants or beadles who carried the fasces before the superior magistrates: it was also a part of their office to be the publick executioners in beheading, scourging, &c.

LIEGE, in law, a term sometimes used for liege-lord, or one who owns no superiour; and sometimes for liege-men, or one who owes allegiance to the liege-lord. In our statutes, the king's subjects are sometimes called lieges, or liege people.

LIEN, the spleen, in anatomy. See SPLEEN.

LIENTERY, in medicine, a disorder proceeding from a preternatural smoothness of the intestines, in consequence of which, what is discharged by stool, greatly resembles the aliments, both in colour and substance.

LIEUTENANT, a deputy, or officer, who holds the place of another, and discharges that function in his absence, which he ought to exercise in person.

LIFE, *Vita*, is peculiarly used to denote the animated state of living creatures, or the time that the union of their soul and body lasts.

Lord Bacon makes the prolongation of life one of the three branches into which he divides medicine.

Doctor Halley, Mr. De Moivre, and others, have taken laudable pains in estimating the probabilities of life from the bills of mortality; whence the value of annuities for life have been determined. See MORTALITY and ANNUITY.

LIGAMENT, in anatomy, a strong compact substance, serving to join two bones together. A ligament is more flexible than a cartilage, not easily ruptured or torn, and does not yield, or at least very little, when pulled. Some ligaments are designed to strengthen the joints, and to secure the bones in their several motions from parting from each other, as happens in luxations; other ligaments serve to connect cartilages with bones; and some there are which strengthen other parts, besides the bones and cartilages; of this last kind are the annular ligaments, so called, not so much from their figure as from their use, serving, like a ring, to bridle the tendons of many muscles. Some ligaments again are fixed to one or more bones, with different degrees of tension, and serve on each side for the insertion of muscles. To these may be added, the ligaments commonly termed aponeuroses; such as those of the temples, scapula, os humeri, ulna, palm of the hand, thigh, leg, and sole of the foot. Other differences of ligaments may be deduced from their consistence, solidity, situation and figure; some are almost cartilaginous, and others have a particular elasticity, by which they are capable of being drawn out by a sufficient force, and of contracting again when left to themselves.

LIGATURE, in surgery, is a chord, band or string; or the binding any part of the body with a chord, band, fillet, &c. whether of leather, linen, &c. Ligatures are used to extend and replace bones that are broken or dislocated; to tie the patients down in lithotomy and amputations; to tie upon the veins in phlebotomy, or the arteries in amputations, or in large wounds; to secure the splints that are applied to fractures; to tie up the processes of the peritonæum, with the spermatick vessels in castration; and, lastly, in taking off warts or other excrescences by ligature. For the manner of using them, see the articles LITHOTOMY, PHLEBOTOMY, FRACTURE, &c.

LIGHT, *Lux*, in physiology, certain subtile particles of matter, capable of exciting in us the sensation of colours. Light undoubtedly consists of inconceiveably small particles of matter, of different magnitudes; which are emitted or reflected from every point in the surface of a luminous body in right lines, and in all directions, with an unparelled velocity; and whose power or intensity decreases as the squares of the distance increase.

That light is a material substance, appears from its being propagated in time, and from its acting upon and producing great alterations in other bodies; but that its particles are inconceivably small appears from hence, that the greatest quantity of flame is found to have scarce any sensible gravity or weight: also because these particles pervade the pores of all transparent bodies, however hard or heavy. Yet small as they are, we find the rays of light consist of different sorts of these particles; and that this difference arises from their different magnitudes, seems evident from the different directions the several sorts of rays move in, after they have passed through a body of glass, water, &c. of some special figure, especially that of a prism. See COLOUR.

The divine wisdom and providence appear, perhaps, in nothing so remarkably as in the extreme subtilty of the particles of light: without this qualification it could not have pervaded the pores of bodies, and so we could have had none of those which we call diaphanous or transparent substances, and every thing but the surface of a body would have been concealed from the sight of mankind. Again, the velocity of a body is always as the quantity of matter inversely; and, therefore, the smaller the body, the greater velocity it is susceptible of from the same force; whence it comes to pass that light is thus qualified to be transmitted through immense distances in a small and insensible part of time; which thing was quite necessary, according to the present frame and state of nature.

But, lastly, it was absolutely necessary that the particles of light should be so exceeding small, that, when compounded with its velocity, it should produce no sensible force, as it must otherwise have done, and which, therefore, could not have been borne by the tender and delicate texture of the several parts of vegetable and animal bodies. To give an example: the velocity of a particle of light is found to be at the rate of 897600000 feet per second; suppose its matter to be but one millionth part of a grain, then its force to strike an object would be as $\frac{897600000}{1000000} = 897,6$ feet per second for one grain; or it would strike with the same force that one grain weight would do falling from half the height, viz. through 448,8 feet; which we should find to be very great, was the experiment to be made on the sensible coats of the eye.

Since the weight of bodies is proportional to the quantity of matter, it follows, that, where the latter is diminished indefinitely, the former will be so too; therefore, the weight of light must be insensible to ever so great a quantity of it.

Dr. Boerhaave caused a globe of iron, 12 inches in diameter, to be heated red-hot, and suspended at the end of a very exact balance, and counterpoised by weights at the other end very nicely, and thus let it hang till all the particles of heat or light were escaped, when he found the equilibrium of the balance no ways altered; which plainly proves the above thesis. See FIRE.

That the particles of light have not only magnitude, but that in different degrees also, is another, and perhaps the most subtile, discovery of the Newtonian philosophy. The comparative terms of greater and lesser are now as applicable to the particles of light, as to any other bodies. This is absolutely proved by the different refrangibility they are found to have in passing through a prismatick figure of glass or water; for the power of the prism detains the issuing particle, and draws it a little towards the surface; and, since this power is the same, it would have the same effect on all the particles of light, if they were all of an equal magnitude, because they have all an equal velocity. But since this effect is different among the particles, some being detained and drawn aside to a greater distance than others, it follows, they must be less in magnitude, to become more subject to the influence of the attracting surface; in like manner as the electrick effluvia will act upon and agitate very small and light bodies, much sooner and more easily than they can move those which are larger. But of this more when we come to speak of the manner in which this power acts in refracting the rays of light. See REFRACTION.

If light were not reflected from every point in the surface of a body in all directions every way, there might be assigned a point of space where a ray of light, from such a point in the surface, does not come; and there the said point of the surface could not be visible; but because the eye can find no point of space in all the visible hemisphere respecting that point, but where it is visible; therefore a ray of light is reflected from that point to every part of space, from whence a right line to that point can be drawn.

That the rays of light proceed in a right-lined direction, is evident from hence, that whatever the figure of the body be, if it be held perpendicular to the rays of light, it will always cast a shadow of the same figure

againſt a parallel plane. Thus a circle will produce a circular ſhadow, a triangle a triangular one, and ſo on. Which plainly ſhews that the rays of light paſs by the extremities of theſe bodies in right-lined directions, excepting theſe only which paſs contiguous to the edges of the body; for they will be a little inflected, which will cauſe the extremity of the ſhadow to be not ſo diſtinct and well defined as it otherwiſe would be; of which we ſhall take further notice hereafter.

As all the other affections of light, ſo that of its velocity was utterly unknown to all the ancient, and moſt of the modern philoſophers, who, before the time of Mr. Romer, were of opinion that the motion of light was inſtantaneous, or that it was propagated through immenſe ſpaces in an inſtant. But Mr. Romer, and other philoſophers, about this time, making frequent obſervations on the eclipſes of Jupiter's moons, found that the time of theſe eclipſes did not correſpond to the calculations founded upon the aſtronomical tables; where the times are all calculated for the diſtance of the centre of the ſun, and conſequently where the eye of the ſpectator muſt be ſuppoſed to be in viewing the ſaid eclipſes, occultations, &c. of Jupiter's moons. To illuſtrate this matter, let S (*plate* XLVIII. *fig.* 5) be the centre of the ſun, A B the orbit of Mercury, C D the orbit of Venus, E F that of the earth, and G H a part of the orbit of Jupiter. Let I be the body of Jupiter, and K L its ſhadow; O M N the orbit of one of Jupiter's moons, M juſt entering the ſhadow of Jupiter. Now a ſpectator at S would obſerve the moon M to enter the ſhadow, juſt at the time which is calculated from the tables; but a ſpectator on the earth at T, always obſerves it to happen ſooner; and, when the earth is in the oppoſite part of its orbit R, he will always obſerve it to happen later, by the ſpace of about ſeven minutes, in both caſes. This obſervation gave the firſt proof that light was progreſſive, and took up about 14 minutes to paſs over the diameter of the earth's orbit from T to R, or ſeven minutes to paſs from the ſun S to the earth T.

But this, though a ſufficient diſcovery or proof of the progreſſive motion of light, was yet but an experiment in the groſs, and not accurate to determine or define the true rate of velocity which properly belonged to light; the ſolution of this noble problem was reſerved for Dr. Bradley, who by reiterated and certain experiments, obſerved, that the bright ſtar in the head of Draco appeared 39″ more northerly in September than in March, juſt the contrary way to what it ought to appear by the annual parallax of the ſtars, which muſt ariſe from the velocity of light bearing ſome proportion to that of the annual motion of the earth. See Aberration *of the Stars*.

To illuſtrate this, and from thence to determine the velocity of light: let A B (*fig.* 6.) repreſent a part of the earth's annual orbit, and let C be a ſtar obſerved by a ſpectator at the earth at A; when the earth arrives at B, the ſtar will not be obſerved at C, as before, but at D in the line B D parallel to A C; for let A B be divided into equal parts A *a*, *a b*, *b c*, *c d*, and *d* B; then through theſe points draw the lines *a e*, *b f*, *c g*, *d h*, parallel to A C and D B. Now let the velocity of the earth be to that of light as A B to C B. When the earth ſets out from the point A, ſuppoſe the ray of light commences its motion from the ſtar at C in the direction C B perpendicular to A B; then it is plain, when the earth is arrived at *a*, the particle of light will be got to *i*, the point where *a e* cuts B C, and the ſtar will be ſeen in the direction *a i* and appear at *e*. In like manner, when the earth is at *b*, the particle of light will be come to *k*, and will appear at *f*, and ſo on; when the earth is at *c*, *d*, B, the particle will be at *l*, *m*, and B, and the ſtar will appear at *g*, *h*, and D.

If therefore the line C A repreſents the axis of a teleſcope, making the angle B A C with the direction of the earth's motion A B; when he comes to B, he will ſee the ſtar at D, which he could not do, if the teleſcope was directed in the perpendicular line B C; but the difference of the poſitions of the lines D B and B C, or the angle D B C, is ſo very ſmall, as to amount to no more than 20″ 15‴, which gives the proportion of the ſides B C to C D or A B, as 10210 to 1; which ſhews that the velocity of light is 10210 times greater than the velocity of the earth in her orbit.

But the velocity of the earth is known, which is about 500,000,000 miles in 365 days, or about 56,000 miles per hour; whence the velocity of light will be found to be ſuch as carries it through the ſpace of 170,000 miles, or 897,600,000 feet in one ſecond; and, therefore, it will paſs from the ſun to us in 8′ and 13″.

If a canon will throw a ball one mile perpendicular height, or 5280 feet, the velocity with which it goes from the cannon's mouth is the uniform velocity of 10,560 feet per 18″ (which is the time of the perpendicular aſcent or deſcent) and, therefore, the velocity of the cannon-ball is 578 feet per ſecond. Whence the velocity of light is to that of the cannon-ball, as 897,600,000 to 578, or as 1,550,000 to 1 nearly.

The doctor found that the parallex of the fixed ſtars, inſtead of amounting to many ſeconds, as many have deduced from their obſervations, does not make one ſecond; and from thence it follows that the above-mentioned ſtar, in Draco, is about 400,000 times further from us than the ſun; and conſequently that the light takes up above $493'' \times 400,000 = 197,200,000$ ſeconds (which is more than ſix years) in coming from that ſtar to us.

For the properties of reflected and refracted light, ſee Reflection and Refraction.

For the doctrine of the colours of light, ſee Colour.

Light, is alſo uſed to ſignify the diſpoſition of objects, with regard to the receiving of light.

Light, in architecture, implies doors, windows, and other places, through which the air and light have a paſſage.

Light, is alſo uſed to ſignify the luminous body which emits it.

Lights, in painting, are thoſe parts of a piece, which are illuminated, or that lie open to the luminary by which the piece is ſuppoſed to be enlightened, and are therefore painted in bright vivid colours.

Different lights have very different effects on a picture, and occaſion a difference in the management of every part. A great deal therefore depends upon the painter's chuſing a proper light for his piece to be illuminated by, and a great deal more, in the conduct of the lights and ſhadows, when the luminary is pitched upon.

Light-*Horſe*, denotes horſemen lightly armed, ſo as to enter a corps or regiment, in contradiſtinction to the men at arms, who were heavily armed, and accoutred at all points.

Light-*Houſe*, in maritime affairs, a houſe built on the ſhore, rock, &c. where a light is kept during the night to direct veſſels near the place.

LIGHTER, a ſort of veſſel or large boat employed in harbours or rivers, particularly the Thames, to bring goods to and from a ſhip in the act of lading and delivering the cargo. See Cargo.

LIGHTNING, in phyſiology, the burſting of fire from a cloud.

From Dr. Franklin's experiments, it appears that lightning is only electrical fire drawn off from the clouds; and, in effect, this electricity has been collected, during thunder, in iron bars, or in tin tubes, in many parts of Europe. See Electricity.

Thunder, then, or lightning, is, in the hand of nature, what electricity is in ours; the wonders which we now exhibit at pleaſure, are only little imitations of thoſe great effects which frighten us. A cloud prepared by the action of winds, by heat, by a mixture of exhalations, &c. is the electrified body; and watry clouds, or terreſtrial matter, the non-electricks which excite it. See Thunder.

LIGULATED, among botaniſts, an appellation given to ſuch floſcules as have a ſtraight end, turned downwards, with three indentures, but not divided into ſegments.

LIGUSTICUM, lovage, in botany, a genus of plants, the general corolla of which is uniform, and the ſingle flowers conſiſt each of five lanceolated petals, bent inwards at the points: the fruit is naked, oblong, angulated, ſulcated, and ſeparable into two parts; and containing two oblong, ſmooth ſeeds, plane on one ſide, and ſtriated on the other.

LIGUSTRUM, privet, in botany, a genus of trees, with a funnel-faſhioned flower, quadrifid or quinquifid at the limb: the fruit is a globoſe ſmooth berry, with only

only one cell, containing four feeds, convex on one fide, and angulated on the other.

LILACK, in botany, a genus of trees, otherwife called fyringa. See SYRINGA.

LILIACEOUS, an appellation to fuch flowers as refemble that of the lily.

LILY, *Lilium*, in botany, a genus of the hexandria monogynia clafs of plants, with a campanulated flower, rifing narrow out of the cup, and expanding towards the limb: it confifts of fix erect petals, obtufe at the points, which are bent backwards: the fruit is an oblong capfule, with three cells, in which are contained a great many fmall feeds.

White lily-roots are emollient, and fuppurative; being ufed with fuccefs in cataplafms, intended for thefe purpofes. The flowers are alfo emollient and anodyne. They are only ufed externally, and that either in the form of a cataplafm, or of an oil by infolation.

LILY *of the Valley*, *Lilium Convalium*, in botany, a beautiful fpecies of the lily, whofe flowers are compofed of little white florets, in the form of a bell, and divided lightly into five or fix fegments at the mouth. They fhrivel up and become brown in drying; while frefh, they have an extremely fragrant fmell, but this they lofe alfo with the colour, and with thefe a great part of their virtues in this preparation; fo that they fhould always be ufed either frefh gathered, or preferved in proof fpirit; but in this laft cafe, the fpirit muft be ufed with them, otherwife a great part of their virtues will be left in it. The plant which produces them is one of the hexandria monogynia of Linnæus, and of the herbæ bacciferæ of Mr. Ray.

It grows wild with us in many places, but in moft of them it fhews only the leaves, never flowering; in fome however, where it has a proper expofure, it fpreads abundantly, and flowers as well as in our gardens; in many of which it is kept as a great beauty, and one of the moft fragrant flowers known.

Lily of the valley flowers are efteemed cephalick and nervine; they are recommended againft convulfions, vertigos, apoplexies, palfies, and all diforders of the head and nerves. They are preferved by fome in fugar, in form of a conferve, and by others are made into a firup by means of a ftrong infufion; but neither of thefe ways are fo good as the diftilling of a rectified fpirit from them in a balneum vaporis, and repeating this with frefh flowers three or four times: the fpirit will then be fully fated with their fine effential oil, very fragrant and poffeffed of all their virtue. Some people make their effence of ambergreafe with this fpirit of lilies of the valley, inftead of plain fpirit of wine. It is much the more fragrant for this, and is efteemed a very great cordial, and provocative to venery. None of thefe forms however are in the fhops; the flowers are only known there as ingredients in two or three compofitions.

LIMB, *Limbus*, the graduated edge of an aftrolabe, quadrant, &c. It alfo denotes the primitive circle of any projection of the fphere in plano; as alfo the outermoft edge of the fun or moon, when the difck or middle part of either is hid in an eclipfe. The lower and upper limbs of the fun are obferved, in order to find his true height, which is that of his centre.

LIMB, in botany, the outer edge of plants, their leaves and flowers.

LIMBERS, or LIMBER-HOLES, in fhip-building, fmall holes in the lower part of the timbers of a fhip, clofe to the keel; the purpofe of which is, to let the water, which may have come in by a leak, have a free paffage to the well, where the pumps are fixed to draw it out; for this purpofe every floor-timber is fitted with two of thefe, viz. one on each fide of the kelfon.

LIMBER-BOARDS, fhort pieces of plank which form a part of the cieling of a fhip's floor clofe to the kelfon, and immediately above the limber-holes: they can be occafionally removed to clear the limbers, when they are filled or clogged with any filth, fand, gravel, &c.

LIME, *Calx*, a white, foft friable fubftance, prepared of ftone, marble, chalk, or fome other ftony fubftance, by burning in a kiln. There are two kinds of lime in common ufe in England, the one made of ftone, and the other of chalk, whereof the former is much the ftrongeft. That which is made of foft ftone or chalk, is the fitteft for plaftering of cielings, and walls within doors; and that made of hard ftone, is fit for ftructures or buildings, and plaftering without doors, that lie in the weather. And that which is made of a greafy, clammy ftone, is ftronger than that made of a poor lean ftone; and that which is made of a fpongy ftone, is lighter than that made of a firm and clofe ftone; that is again more commodious for plaftering, this for building.

Before the ftones are thrown into the kiln, they are to be broken to pieces; otherwife the air contained in their cavities, being too much expanded by heat, makes them fly with fo much violence as to damage the kilns.

Alberti and Palladio fay, that lime will not be fufficiently burnt in lefs than 60 hours; and Alberti gives the marks of a well-burnt lime to be as follow, viz. that its weight is to that of the ftone in a fefquialterate proportion; that it is white, light, and fonorous; that, when flaked, it fticks to the fides of the veffel. To which Boeckler adds, that, when flaked, it fends forth a copious thick fmoke; and Dieuffant, that it requires a great deal of water to flake it.

It has been found by feveral late experiments, made by Dr. Alfton, that lime-water is an excellent remedy for the ftone; and that it has been given with extraordinary fuccefs in acute fevers. Sponius fays, that when drank with milk or whey, it performs wonderful effects in internal ulcers, diarrhœas, and the dyfentery.

Lime-water, on being mixed with linfeed-oil, or the oil of olives, and well fhaken, acquires the confiftence of a balfam, which is of fingular fervice when applied externally in frefh burns, and alfo conduces to ftop inflammations. It may alfo be impregnated with copper, by ftanding in a brazen bafon: by which means it affumes a beautiful fapphire colour, and proves an excellent remedy againft puftules, ulcers, fcadies, and itching of the eyes; and this laft preparation mixed with a little fal ammoniack, is recommended againft all humours, films, and other blemifhes of the eyes, and is faid to be very efficacious when the eyes are hurt by the fmall-pox; and there is no remedy more effectual for cancerous ulcers.

LIMIT, in a reftrained fenfe, is ufed by the mathematicians for a determinate quantity, to which a variable one continually approaches; in which fenfe, the circle may be faid to be the limit of its circumfcribed polygons. In algebra, the term limits is applied to two quantities, one of which is greater, and the other lefs, than another quantity; and in this fenfe it is ufed, in fpeaking of the limits of equations, whereby their folution is much facilitated.

LIMITATION, in law, fignifies a certain fpace of time allowed for bringing actions.

LINE, *Linea*, in geometry, a quantity extended in length only, without any breadth or thicknefs. It is formed by the flux or motion of a point. See FLUXION.

There are two kinds of lines, viz. right lines and curve lines. If the point A (*plate* XLVII. *fig.* 2.) move towards B; by its motion, it defcribes a line, and this, if the point go the neareft way towards B, will be a right or ftraight line, whofe diftinction therefore is the neareft or fhorteft diftance between any two points; or a line, all whofe points tend the fame way. If the point go any way about, as in one of the lines ABC, or AcB, it will trace out either a crooked line as the upper AcB, or elfe two more ftraight ones as in the lower ACB. Right lines are all of the fame fpecies, but curves are of an infinite number of different fpecies. We may conceive as many as there may be different ratios between their ordinates and abfciffes. See ABSISSE and ORDINATES.

Curve lines are ufually divided into geometrical and mechanical; the former are thofe which may be found exactly in all their points; the latter are thofe, fome or all of whofe points are not to be found precifely, but only tentatively, or nearly. Curve lines are alfo divided into the firft order, fecond order, third order, &c. See CURVE.

Lines confidered as to their pofitions, are either parallel, perpendicular, or oblique, the conftruction and properties whereof fee under PARALLEL, &c.

Euclid's fecond book treats moftly of lines, and of the effects of their being divided and again multiplied into one another.

LINE, in geography, the fame with equator. See EQUATOR.

LINES,

Lines, in aſtronomy, are, 1. Fiducial line, the line or ruler which paſſes through the middle of an aſtrolabe, or the like inſtrument, and on which the ſights are fitted, otherwiſe called alhidade, index, dioptra, and medicilium. See Astrolabe. 2. The horizontal line. 3. Iſochronal lines. 4. Meridian line. 5. Line of the nodes. See the articles Horizontal, Isochronal, Meridian and Nodes.

Lines, in perſpective, are, 1. Geometrical line, which is a right line drawn in any manner on the geometrical plane. 2. Terreſtrial line, or fundamental line, is a right line, wherein the geometrical plane and that of the picture or draught interſect one another; ſuch is the line NI, (*plate* XLVII. *fig.* 1.) formed by the interſection of the geometrical plane LM, and the perſpective plane HK. 3. Line of the front, is any right line parallel to the terreſtrial line. 4. Vertical line, the common ſection of the vertical and of the draught. 5. Viſual line, the line or ray imagined to paſs from the object to the eye. 6. Line of ſtation, according to ſome writers, is the common ſection of the vertical and geometrical planes. Others, as Lamy, mean by it the perpendicular height of the eye above the geometrical plane: others a line on that plane, and perpendicular to the line expreſsing the height of the eye. 7. Objective line, the line of an object from whence the appearance is ſought for in the draught or picture.

Line *of Diſtance.* See Distance.

Lines, in dialling, are, 1. Horizontal line, the common ſection of the horizon and the dial-plane. See Dial. 2. Horary lines, or hour-lines, the common interſections of the hour circles of the ſphere, with the plane of the dial. See Horary. 3. Subſtylar line, that line on which the ſtyle or cock of a dial is duly erected, and the repreſentation of ſuch an hour-circle as is perpendicular to the plane of that dial. 4. Equinoctial line, the common interſection of the equinoctial and plane of the dial.

Contingent Line. See Contingent.

Line *of Meaſures*, is uſed by Oughtred, to denote the diameter of the primitive circle in the projection of the ſphere in plano, or that line in which the diameter of any circle to be projected falls. In the ſtereographick projection of the ſphere in plano, the line of meaſures is that line in which the plane of a great circle perpendicular to the plane of the projection, and that oblique circle which is to be projected, interſects the plane of the projection; or is it the common ſection of a plane paſſing through the eye-point and the centre of the primitive at right angles to any oblique circle which is to be projected, and in which the centre and pole of ſuch circle will be found.

Line *of Direction* on the earth's axis, in the Pythagorean ſyſtem of aſtronomy, the line connecting the two poles of the ecliptick and of the equator, when they are projected on the plane of the former.

Line *of Direction*, in mechanicks, that wherein a body actually moves, or would move, if it were not hindered. It alſo denotes the line that paſſes through the centre of gravity of the heavy body to the centre of the earth, which muſt alſo paſs through the fulcrum, or ſupport of the heavy body, without which it would fall.

Line *of Gravitation* of any heavy body, a line drawn through its centre of gravity, and according to which it tends downwards.

Line *of the ſwifteſt Deſcent*, of a heavy body, is the cycloid. See Cycloid.

Line *of a Projectile.* See Projectiles.

Lines *on the plane Scale*, are the line of chords, line of ſines, line of tangents, line of ſecants, line of ſemitangents, line of leagues; the conſtruction and application of which ſee under the articles Scale, Sailing, &c.

Lines *on Gunter's Scale*, are the line of numbers, line of artificial ſines, line of artificial tangents, line of artificial verſed ſines, line of artificial ſines of rhumbs, line of artificial tangents of the meridian line, and line of equal parts; for the conſtruction and application whereof, ſee Gunter's *Scale.*

Lines *of the Sector*, are the line of equal parts, or line of lines, line of chords, line of ſines, line of tangents, line of ſecants, line of polygons, line of numbers, line of hours, line of latitudes, line of meridians, line of metals, line of ſolids, line of planes; for the conſtruction and uſe whereof, ſee Sector.

Lines, in fortification, are thoſe of approach a capital, defence, circumvallation, contravallation, of the baſe, &c. See Approach, &c.

To Line *a Work*, ſignifies to ſtrengthen a rampart with a firm wall; or to encompaſs a parapet or moat with good turf, &c.

Line, in the art of war, is underſtood of the diſpoſition of an army, ranged in order of battle, with the front extended as far as may be, that it may not be flanked. See Army.

Line *of Battle*, is alſo underſtood of the diſpoſition of a fleet on the day of engagement, on which occaſion the veſſels are uſually drawn up as much as poſſible in a ſtraight line, as well to gain and keep the advantage of the wind, as to run the ſame on board.

Ship of the Line, a veſſel large enough to be drawn up in the line, and to have a place in a ſea-fight. See Ship.

Line, in fencing, that part of the body oppoſite to the enemy, wherein the ſhoulders, the right arm, and the ſword, ought always to be found; and wherein are alſo to be placed the two feet at the diſtance of eighteen inches from each other. In which ſenſe a man is ſaid to be in his line, or to go out of his line, &c.

Line *of Demarcation*, or *Alexandrian* Line, a meridian paſſing over the mouth of the river Moragnon, and by the capes Houmas and Mallabrigo, ſo called from pope Alexander VI. who, to end the diſpute between the crowns of Caſtile and Portugal, about their boundaries, drew an imaginary line on the globe, which was to terminate the pretenſions of each. By this partition, the E. Indies fell to the ſhare of the Portugueſe, and the W. Indies to the Caſtilians.

Line *of the Synodical*, in reference to ſome theories of the moon, is a right line ſuppoſed to be drawn through the centres of the earth and ſun; and, if it be produced quite through the orbits: it is called the line of the true ſyzygies: but a right line imagined to paſs through the earth's centre, and the mean place of the ſun, is called the line of the mean ſyzygies.

Line, in genealogy, a ſeries or ſucceſſion of relations in various degrees, all deſcending from the ſame common father.

Direct line, is that which goes from father to ſon; being the order of aſcendants and deſcendants.

Collateral line, is the order of thoſe who deſcend from ſome common father related to the former, but out of the line of aſcendants and deſcendants; in this are placed uncles, aunts, couſins, nephews, &c. See the articles Direct and Collateral.

Line alſo denotes a French meaſure, containing the twelfth part of an inch, or the hundredth and forty-fourth part of a foot. Geometricians conceive the line ſubdivided into ſix points. The French line anſwers to the Engliſh barley-corn. See Foot, Inch, &c.

Lines, in muſick, the names of thoſe ſtrokes drawn horizontally on a piece of paper, on and between which the characters and notes of muſick are diſpoſed: their number is commonly five; when another is added, for one, two, or more notes, it is called a ledger-line.

Lines, in heraldry, the figures uſed in armories, to divide the ſhield into different parts, and to compoſe different figures. Theſe lines, according to their different forms and names, give denomination to the pieces or figures which they form, except the ſtraight or plain lines.

Lines, among fowlers, is uſed to expreſs the things by which they catch birds.

LINEA Alba, in anatomy, the concourſe of the tendons of the muſcles of the abdomen, extending from the ſternum to the juncture of the oſſa pubis, in form of a broad and ſtrong white ſtreak, and dividing the abdomen into two. See Abdomen.

LINEAMENT, among painters, is uſed for the outlines of a face. See Contour.

LINEAR Numbers, in mathematicks, ſuch as have relation to length only; ſuch is a number which repreſents one ſide of a plane figure. If the plane figure be a ſquare, the linear number is called a root.

Linear *Problem*, that which may be ſolved geometrically, by the interſection of two right lines. This is called a ſimple problem, and is capable of ſolution.

LINEN,

LINEN, in commerce, a well known kind of cloth, chiefly made of flax. See FLAX.

LINGUALIS MUSCULUS, in anatomy, a muscle of the tongue taken notice of by Douglas: it arises, says he, pretty large and fleshy from the basis of the tongue laterally, and runs straight forwards between the cerato and genio-glossus to the tip. It is hard to determine whether it ends there, or returns circularly after the same manner on the other side to the root of the tongue again. It serves to contract or narrow the substance of the tongue, and at the same time to bring it backwards and downwards.

LINIMENT, *Linimentum*, in pharmacy, a composition of a consistence somewhat thinner than an unguent, and thicker than oil, used for different parts of the body in various intentions. The materials proper for composing of a liniment, are oils, fats, balsams, and whatever enters the composition of unguents and plasters. The best way of using liniments, is to apply them after the pores have been opened by friction or fomentations. There are many sorts of liniments directed in pharmaceutical writers, but we shall content ourselves with giving that called linimentum Arcæi, prepared as follows: take of gum elemi, and turpentine of fir, of each an ounce and an half; of old and depurated mutton suet, two ounces; of old and depurated hog's lard, an ounce; mix them, and make an ointment. Oils, unguents, and the fat of animals, or whatever any part is anointed with, are comprehended under the name liniment.

LINNÆA, in botany, a genus of the didynamia-angiospermia class of plants, the corolla of which is monopetalous, turbinated, semi-quinquifid, obtuse, almost equal, and greater than double the cup of the flower; the fruit is a roundish bilocular berry; the seeds are solitary and roundish.

LINSEED, the seed of the plant linum. Linseed bruised and steeped in water, gives it very soon a thick mucilaginous nature, and communicates much of its emollient virtues to it. It is anodyne, attemperating, and of great service in suppressions of urine from inflammation and heat; it envelops the acid salts of the urine, and prevents their vellicating and wounding the tender parts; and in some measure supplies the mucus of the bladder, when abraded and worn off. It is to be given in decoction, or infusion, on these occasions: the infusion is not to be made too thick or mucilaginous, because in that case it loads the stomach, and breeds flatulences in the intestines. A slight infusion of linseed, by way of tea, is recommended by many as an excellent pectoral; and the seed is a common and very good ingredient in clysters. Externally, this seed, ground to powder, is an excellent emollient; as is also the strong mucilage, made by boiling the seeds a long time: the oil drawn from it by expression is of great service in coughs, pleurisies, and many other cases.

LINSTOCK, in gunnery, a short staff of wood, about three feet long, having at one end a piece of iron divided into two branches, each of which has a notch to hold a lighted match, and a screw to fasten it there; the other end being shod with iron to stick into the ground.

LINTEL, in architecture, the piece of timber that lies horizontally over door-posts and window-jaums, both to support the wall over it, and bind the sides of the wall together.

LINUM, flax. See FLAX.

LION, *Leo*, the strongest and fiercest of all quadrupeds: it is a species of the felis, with an elongated floccose tail, and a mane on the neck, and larger in size than the mastiff; its head is large, and the breast broad in proportion to the other parts; the legs are also very thick and strong, and its claws of a surprising length and thickness: the fur of the whole body is of a tawney yellow colour. The lioness is, in all respects, like the lion, except that she wants the mane; but this makes so great a difference in her appearance, that she seems a creature of a different genus.

LIONCELLES, in heraldry, a term used for several lions borne in the same coat of arms.

LIP, *Labium*, or *Labrum*, in anatomy, the exterior fleshy covering of the mouth. See MOUTH.

The cheeks and lips form the sides and entry of the cavity of the mouth. They are formed in general by the connection of several fleshy portions, of different breadths, fixed round the two jaws, covered on the outside with the skin and fat, and lined on the inside by a glandulous membrane. Besides this, the lips have a soft spongy substance, which swells and subsides on certain occasions, independently of the action of the muscles; and is mixed with fat. The substance that forms the red border of the lips is a collection of very fine, long, villous papillæ, closely connected together, and covered by a fine membrane: which seems to be both a continuation of the epidermis, and of that pellicle which covers the glandulous membrane of the cavity of the mouth. This substance is extremely sensible. The internal membrane of the upper-lip forms a small middle frænum above the first dentes incisorii. The arteries which go to the lips are ramifications of the external carotid, and principally of the external and internal maxillary branches. See ARTERY.

The veins are ramifications of the external anterior jugular. See VEIN.

The nerves of these parts come from the maxillaris superior and inferior, which are branches of the fifth pair and also from the portio dura of the auditory nerve, or sympatheticus minimus, the ramifications of which are spread in great numbers on all these parts, and communicate very singularly with the nerves of the fifth pair in several places. There is so much variety in the muscles of the lips, in different objects, that it is not at all surprising to find anatomists disagree in the description of them. The muscles of the lips are usually divided into common and proper; the common are those which end at the angles of the two lips; and those are proper which are fixed in one lip only, which are again subdivided into proper muscles of the upper-lip, and proper muscles of the under-lip. The common muscles are the semi-orbiculares, supra-semi-orbiculares, buccinatores, and zygomatici majores. The proper muscles of the upper-lip are the zygomatici minores, canini, incisorii laterales, and incisorii medii. Those of the under-lip, the triangulares, triangularium collaterales, quadratus, incisorii inferiores, and cutanei. The upper-lip is sometimes moved by the action of the muscles of the nose, especially the pyramidales; and both lips, either jointly or separately, are moved by suction, without the assistance of their proper muscles. The common muscles of the lips either draw both corners of the mouth at once, or only one at a time, according to the different direction of their fibres. The proper muscles pull the different parts of the lips in which they are inserted. The buccinatores, in particular, may serve to move the food in mastication.

Hare-LIP, a disorder in which the upper-lip is in a manner slit or divided, so as to resemble the upper-lip of a hare, whence the name. Sometimes the division is so large, that it appears as if part of the lip was wanting; and sometimes again the division is double. A like fissure is also sometimes made in the lower lip by a wound that has been neglected, or improperly treated: this last species of the disorder is termed the spurious hare-lip; the true kind is born with the infant. The less and more equal the fissure of the hare-lip is, it is generally so much the more easily cured. In some infants, the division of the lip is so large and irregular, that there can be but little hopes of a cure, which may, however, be easily performed on the very same lip, when adult. Sometimes too we meet with a tooth projecting forward into the fissure; in this case it cannot be cured without first taking out the tooth. In a recent hare-lip, or one made by a wound, the cure is to be performed by the knotted suture. See SUTURE and WOUND.

In curing the hare-lip, where part of the lip is wanting, no attempt can be made to supply what is deficient, but only to unite those parts which are divided, by taking off the skin from the edges of the fissure, and then causing them to unite and grow together, by passing through them two or three needles, made of gold or silver, pointed with steel, from the right to the left, beginning with the upper part of the fissure, and inserting them at about a straw's breadth from each other; the surgeon having thus entered the needles, and cleansed the bleeding lips with a spunge, he takes a piece of strong wax thread or silk, and fastening it about one end of the needle, he winds it over the other end, and back again, and afterwards secures it by a knot: by this means the edges of the lips are brought close together, and the upper

part or surface kept smooth and even. To heal the wound internally, it is dressed with soft lint dipped in honey of roses, and put between the gums and lip; but this practice can only be followed with adults: the external part of the wound is at the same time dressed with balsam of Peru, or some other vulnerary unguent, covered with lint and compress, and over that a sticking plaster with four heads, two of which are fastened on the left side of the lip, and two upon the right, and the whole secured by a sling or fillet, whose extremities may be fastened about the head, either by a knot or pins. But it must here be observed, that when the fissure appears large and deep, so that the two parts of the lip cannot be easily joined, it will be necessary, before the above operation, to divide the frænulum of the upper lip from the gum with a pair of scissars, but without wounding the gum, or uncovering the jaw. Though the hæmorrhage is often very plentiful in performing these operations on young infants, yet it is not dangerous, since it prevents an inflammation, and generally ceases after tying the bandages.

The dressings ought not to be moved before the third day, unless some accident makes it necessary; and then it must be done with great caution, to avoid separating the parts in contact. If the lips of the wound appear conjoined, three or four days after the operation, you may then venture to draw out the middle needle, when there are three; or the upper one, when there are only two; and two or three days after draw out the other; the cure must be completed by dressing every day, as at first.

LIPOTHYMIA, Fainting, in medicine, may arise from several causes, as too violent exercises, suppression of the menses, or other accustomed evacuations, &c. A lipothymy is often symptomatick, accompanying the scurvy, malignant fevers, and the like disorders; which being cured, the disposition to faintness ceases of course.

As to the cure of an idiopathick lipothymy, proceeding from the sight of blood, wounds, ulcers, or any chirurgical operation, nothing more is necessary than to change the room, and go into fresh air; and if this cannot be done, the smell of hungary water, volatile spirits, wine, and strong vinegar, sprinkling the face with cold water, or a draught of generous wine, will recover the drooping spirits of the patient. When a person to be let blood is afraid of fainting, he should be laid upon a bed.

In more grievous fainting fits, where gentle cordials are of little use, the strongest sort must be applied, as spirit of sal ammoniack, to the nostrils, temples, and pulses, with strong frictions, or forty or fifty drops of volatile spirits may be given internally; to which may be added, cinnamon-water, orange-flower water, or the like; not forgetting a draught of generous wine, with vellications and frictions of the extremities, nose, ears, head, hair, &c. till the person recovers. When the patient is hysterick, none but fœtid things should be applied to the nose; such as castor, assa fœtida, burnt feathers, leather, horn, and the like.

If the lipothymy proceeds from excessive hæmorrhages, they must be stopped as soon as possible; and the patient must take broths, jellies, spirituous liquors, and generous wine, till quite recovered; which remedies are also to be used, when it proceeds from diseases, loss of strength, or a defect of spirits and good juices.

LIPPIA, in botany, a genus of the didynamia-angiospermia class of plants, the flower of which is monopetalous and ringent, with a quadrifid limb; the fruit is a bivalve unilocular capsule, containing two seeds, which grow together.

LIQUIDAMBER, in botany, a genus of the monœcia polyandria class. The calix has four leaves, it has no corolla, but numerous filaments: the calix of the male consists of four leaves in the form of a globe; it has no corolla, but a couple of styli; and the capsules, which are numerous, are round, with a double valve, and contain many seeds. There are two species, both natives of America. This tree yields a fragrant resin, called liquidamber, which resolves and opens obstructions.

The planks of this tree being beautifully veined, are often used in America for wainscotting rooms, but it requires a long time to season the boards, otherwise they are apt to shrink.

LIQUORICE, in botany, the name of a plant much used in medicine. It grows four or five feet high, its stalks are hard and woody; its leaves are small and roundish; and they stand many together on the two sides of a rib, making what authors call a winged leaf. They are viscous to the touch; the flowers are of the papilionaceous kind, small and bluish. The plant is of the diadelphia decandria of Linnæus, and of the herbæ flore papilionaceo seu leguminosæ of Mr. Ray. Liquorice grows wild in many parts of France, Italy, Spain, and Germany. It is cultivated in great abundance in Yorkshire, and in many other parts of England; and by the good order we keep the soil in, it produces better roots, longer, evener, and more succulent than are to be had from any other part of the world. The rest of Europe is in great measure furnished by what grows about Bayonne and Saragossa in Spain.

Liquorice is an excellent medicine in coughs, and all disorders of the breast and lungs. It obtunds the sharpness of acrid and salt humours. It is also recommended against disorders of the kidnies and bladder, and is said to take off the sense of pain in many terrible complaints. It is an ingredient in almost all decoctions and ptisans, in which it is esteemed for obtunding acrimony, and for giving the whole a very pleasant taste, and drowning the worst flavour of the other ingredients.

Liquorice *Juice*, the inspissated juice of the common liquorice root, and is brought to us in rolls or cakes, covered usually with bay leaves from Spain and Holland, from the first of which places it obtained the name of Spanish juice. It is to be chosen firm, but not tough; hard, and when broken, of a fine shining surface; such as perfectly melts in the mouth, and does not taste of burning, nor leaves any harsh or gritty particles between the teeth.

Liquorice juice has the same virtues with the root it is produced from. It is a very famous remedy among the common people for coughs, and all disorders of the breast and lungs. It is commonly taken alone, holding a small piece of it in the mouth till it gradually melts there; but the more agreeable way of taking it is in form of lozenges, of which there are many kinds, which it is the basis of; in these it is mixed with other pectoral ingredients, and has the advantage of melting more easily in the mouth than in its own form. It is also an ingredient in the theriaca, and some other of the compositions of the shops.

LIST, in commerce, the border of cloth, or of a stuff; serving not only to shew their quality, but to preserve them from being torn in the operations of fulling, dyeing, and the like. See Cloth, &c.

List is used on various occasions: but chiefly by gardeners, for securing their wall-trees.

List, in architecture, a little square moulding, called a fillet, listel, &c. See Fillet and Moulding.

LITANY, a solemn form of supplication to God, in which the priest utters some things fit to be prayed for, and the people join in their intercession, saying, We beseech thee to hear us, good Lord, &c.

At first, the use of litanies was not fixed to any stated time, but were only employed as exigencies required. They were observed, in imitation of the Ninevites, with ardent supplications and fastings, to avert the threatning judgments of fire, earthquakes, inundations, or hostile invasions. About the year 400, litanies began to be used in processions, the people walking barefoot, and repeating them with great devotion; and, it is pretended, that by this means, several countries were delivered from great calamities. The days on which these were used, were called rogation days: these were appointed by the canons of different councils, till it was decreed by the council of Toledo, that they should be used every month throughout the year; and thus by degrees they came to be used weekly on Wednesdays and Fridays, the ancient stationary days for fasting. To these days the rubrick of our church has added Sundays, as being the greatest days for assembling at divine service.

LITERATI, in general, denotes men of learning; but is more particularly used by the Chinese, for such persons as are able to read and write their language.

LITHANTHRAX, pit-coal, in natural history, a genus of fossils, defined to be solid, dry, opaque, inflammable substances, found in large strata, splitting horizontally

zontally more eaſily than in any other direction; of a gloſſy hue, ſoft and friable, not fuſible, but eaſily inflammable, and leaving a large reſiduum of aſhes.

Of this genus there are three ſpecies; 1. The hard, duſky, black coal, known in London by the name of Scotch coal. 2. The hard, gloſſy, black coal, known by the ſame name; though both theſe ſpecies are found alſo in England, particularly in Limington and Wales. 3. The friable, gloſſy, black coal, called Newcaſtle coal, as being chiefly dug about that town.

LITHARGE, is properly a recrement, of lead, or lead vitrified, either alone or with a mixture of copper. It is of two kinds, differing in colour, though in no other quality; the one of theſe is called litharge of gold, and the other litharge of ſilver: theſe are collected from the furnaces where ſilver is ſeparated from lead, or from thoſe where gold and ſilver are purified by means of that metal; but the litharge ſold in the ſhops is produced in the copper works, in which lead is uſed either to purify the metal, or to ſeparate the ſilver from it; this is of a reder or yellower colour, as the fire has been more or leſs ſtrong, and is always compoſed of a multitude of thin flakes. Litharge is ſoluble in oil, and all other unctuous ſubſtances; and thus diſſolved, it makes the baſis of a great part of the ointments and plaſters of the ſhops. It is drying, abſtergent, and ſlightly aſtrictive; and hence it is of great uſe in cleanſing ulcers, and diſpoſing them to incarnate.

LITHIDIA, in natural hiſtory, the name of a large claſs of foſſils, including the flint and pebble kinds.

LITHONTRIPTICKS, medicines which either break or are ſuppoſed to have the virtue of breaking ſtones in the urinary paſſages. Of this kind is Mrs. Stephen's medicine, which is a compoſition of ſoap and lime made of different ſhells, which every body knows to be highly cauſtick, and is therefore condemned by Dr. Mead, ſince its corroſive quality muſt be injurious to the bladder: however, under proper management, he thinks it may be of ſome ſervice in expelling gravel by the urinary paſſages; though it will never be able to break calculi of the hardneſs of ſtone. Dr. Whytt, of Edinburgh, after conſidering the inconveniencies, and, ſometimes, miſchiefs of this celebrated ſpecifick, reſolved to omit the ſoap, and try what virtues lime-water would have without it, in diſſolving the calculus; and found that lime-water made by pouring ſeven or eight pints of water on one pound of freſh calcined oyſter or cockle-ſhells, poſſeſſed a greater power of diſſolving the calculus, than that of ſtone-lime; and by giving four pints of it a-day to adults, and to children in proportion, he found that it produced the moſt happy effects.

LITHOPHYTA, in botany, a ſub-diviſion of the cryptogamia claſs of plants; ſo called, from their approaching to a ſtony hardneſs, comprehending the iſis, ſpongia, millepara, tubipora, &c.

LITHOSPERMUM, gromwell, in botany, a genus of the pentandria-monogynia claſs of plants, the corolla of which conſiſts of a ſingle petal of the length of the cup: the tube is cylindrick, the limb ſemiquinquifid, obtuſe and erect: there is no pericarpium, but the cup becomes petalous and long, containing four broad, oval, acuminated and hard ſeeds. The ſeeds of this plant, being the only parts uſed in medicine, are accounted diuretick.

LITHOSTROTION, in natural hiſtory, the name of a ſpecies of foſſile coral, compoſed of a great number of long and ſlender columns, ſometimes round, ſometimes angular, jointed nicely to one another, and of a ſtarry or radiated ſurface at their tops. Theſe are found in conſiderable quantities in the northern and weſtern parts of this kingdom, ſometimes in ſingle, ſometimes in complex ſpecimens.

LITHOTOMY, in ſurgery, cutting for the ſtone. See Stone. The ſeveral methods of performing this dangerous operation, according to Heiſter, are four: the firſt and moſt ancient is the apparatus minor, called likewiſe the Celſian or Guidonian method: the ſecond, the apparatus magnus, or Marianus's method; the latter better termed the new, and the former the old method: the third is the apparatus altus, or hypogaſtrick ſection, wherein the inciſion is made at the lower part of the abdomen in the anterior ſide of the bladder, immediately above the os pubis; whereas in the reſt it is made in the perinæum, between the anus and the ſcrotum: the fourth and moſt modern method was invented towards the end of the laſt century, and is termed the lateral operation.

1. The firſt method is now entirely laid aſide, though Heiſter thinks it practicable on boys under 14: the wound of the bladder in this operation, ſays Sharpe, is made in the ſame place as is now practiſed in the lateral method; but its being impracticable on ſome ſubjects, and uncertain in all others, has made it to be univerſally exploded.

2. In performing lithotomy by the apparatus major, Mr. Sharpe's directions for the ſituation of the patient are thus: having laid the patient on a ſquare horizontal table, three feet four inches high, with a pillow under his head, let his legs and thighs be bent, and his heels made to approach his buttocks, by tying his hands to the ſoles of his feet with a couple of ſtrong ligatures; and, to ſecure him more effectually from ſtruggling, paſs a double ligature under one of his hams, and carry the four ſtrings round his neck to the other ham: then paſſing the loop underneath, make a knot by threading one of the ſingle ends through the loop; and thus the thighs are to be widened from each other, and firmly ſupported by proper perſons.

The patient thus ſituated, Heiſter directs the operation as follows: the operator, dipping the beak of a ſizeable and grooved ſteel catheter in oil, conveys it through the urethra into the bladder; and being aſſured there is a ſtone, turns the crooked part of the catheter in the bladder and urethra towards the left ſide of the perinæum, but the handle and penis which contains it, towards the right inguen; then delivers it to the aſſiſtant, who holds up the ſcrotum in the other hand; for the crooked convex part of the catheter, thus elevated in the perinæum, renders that part of the urethra which is to be divided, ſufficiently perceptible both to the ſight and touch. He next lays hold of the integuments of the perinæum with the fingers of his left hand, holding in his right the inciſion-knife, wrapped in linen, as he would do a pen for writing: with this he makes a longitudinal inciſion downwards, about the middle of the left ſide of the perinæum near the ſuture, through the fat; then he again feels for the catheter, and afterwards divides the urethra in a direct line downwards, ſo that the end of the knife may paſs in the groove of the catheter. After a proper inciſion, the ſurgeon parts with his knife, inſerting in the groove of the catheter, if an aſſiſtant holds it, the nail of his finger or thumb: then he takes a male conductor, dips it in warm oil, and having paſſed it through the groove of the catheter and neck of the bladder into the bladder itſelf, extracts the catheter.

The male conductor being thus paſſed, a female conductor is introduced upon it, in ſuch a manner as the latter receives the prominent back of the former in its groove, and conveys it ſafely into the bladder through its neck. After this, the two conductors are gently ſeparated by their handles, and then a ſtraight forceps, dipt in oil and ſhut very cloſe, is carefully conveyed into the bladder between the conductors. The forceps, after it is introduced, and the conductors withdrawn, muſt be opened ſeveral times to dilate the wound, and then ſhut to ſearch for the ſtone: when the ſtone is found, they muſt be opened with both hands, in ſuch a manner that one jaw, if poſſible, may lay hold under the ſtone, and the other above it. When the ſtone is thus intercepted, the forceps, by a gentle motion from ſide to ſide, muſt be brought towards the rectum, and the ſtone extracted downwards, becauſe the parts dilate and yield more eaſily that way, while upwards they meet with a reſiſtance from the os pubis: but if it lies concealed in any part of the bladder, and cannot be laid hold of by the forceps, the operator muſt paſs the two firſt fingers of his left hand into the anus, elevate the ſtone, and force it into them. If it is ſituated in the upper part of the bladder, behind the oſſa pubis, the inferior part of the abdomen muſt be preſſed downwards by the hand, that it may commodiouſly be taken hold of, and drawn out by the ſtraight or crooked forceps; and if it is lodged on either ſide, the crooked inſtrument is moſt convenient.

When the ſtone is too large to be extracted whole, it muſt be broken by a forceps with teeth, and the fragments

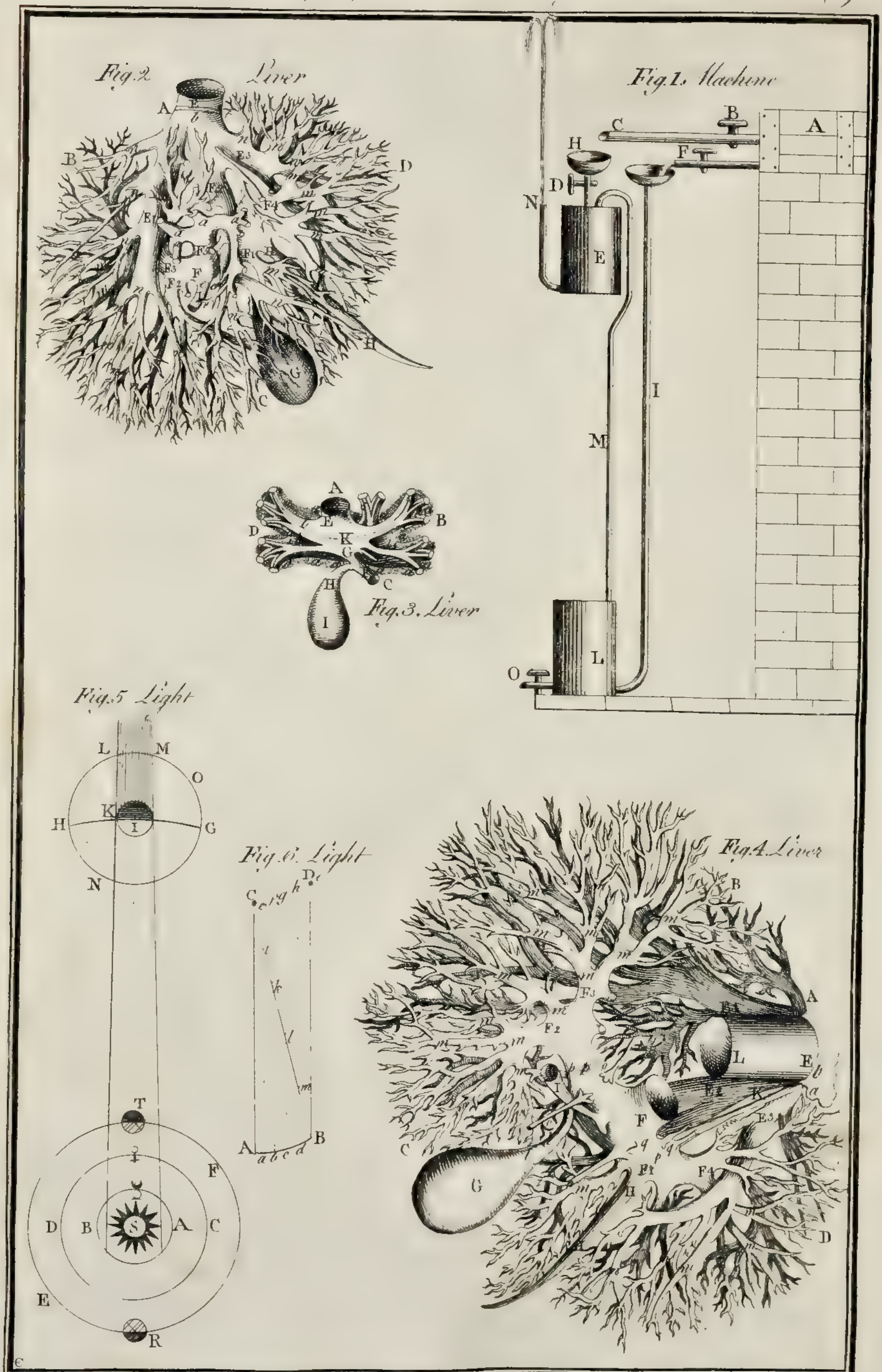


Plate XLVIII

Facing Liver

ments to be drawn out one after another. Laftly, if the ftone is too large and too hard to be either extracted or broken, a prudent furgeon will defift, and heal the wound, or leave a fiftula for the difcharge of the urine. The ftone being thus extracted, and the bladder cleared, the wound is cleanfed with a fponge, the ligatures united, the patient put to bed, and the wound now dreffed with the doffils of fcraped lint: if the hæmorrhage be too profufe, it may be ftopped by pledgets of lint dipt in a proper ftyptick, and the arteries compreffed with the fingers till it ftops.

Thefe muft be covered with a linen bolfter, and a large fquare comprefs without a plafter, fecuring the whole with the T bandage, or that with four heads; and if they are ineffectual, the artery muft be tied up with a crooked needle and thread. See the article HÆMORRHAGE.

After dreffing, the patient muft be fupplied with plenty of ptifan, barley-water, or a ftrengthening and compofing emulfion; his diet fhould be the fame as for people in fevers, or after great wounds. See FEVER and WOUND.

3. The apparatus altus, or high operation, is performed as follows. The patient being duly prepared, and laid in a proper fituation, a hollow filver catheter, with a flexible leathern tube at the end of it, is to be introduced into the bladder: to the tube muft be fitted a large fyringe, for the injecting of fuch warm water, barley-water, or milk, as the patient can bear. When this is done, the catheter is extracted: then, while an affiftant introduces his two fore fingers into the anus to elevate the ftone and bladder, the operator makes an incifion in a right line through the fkin, fat, and abdominal mufcles, immediately above the offa pubis. The external wound fhould be three fingers breadth long in children, and four in adults; then introducing the left index, the furgeon feels for the liquor that diftends the bladder, and then makes an incifion into the bladder immediately above the juncture of the offa pubis: after which he paffes a fmall knife into the body of the bladder, fo as to make a fmall wound with the point only; through this aperture he paffes a crooked or ftraight knife, armed with a button, whereby he enlarges the wound upwards the breadth of one or two fingers. He then introduces his left index to draw the upper part of the bladder towards the navel, and then enlarges the wound downwards. Immediately after, he introduces the fore-finger of the other hand, and examines the fize and fituation of the ftone, and accordingly he enlarges the wound either upwards or downwards, in order to extract it; and when the ftone is extracted, and nothing left, the wound is dreffed, and the patient treated much in the fame manner as in the former cafe.

4. The fourth method, which is called the lateral operation, was performed by Chefelden thus: every thing being properly prepared, he introduces a catheter, and afterwards makes an incifion of a proper length, beginning where they end in the apparatus major, and continuing it downwards between the accelerator urinæ, and erector penis, on the left fide of the inteftinum rectum, and directing his knife to the pofterior part of the catheter, through the inferior and lateral part of the bladder, behind the proftrate gland, and above the feminal veficles; he then continues it forwards through the fphincter of the bladder, and left fide of the proftrate glands into the membranous part of the urethra, even to its bulb, which preferves the rectum better than the lateral method.

Among Chefelden's emendations, Douglafs enumerates thefe: 1. If he finds the patient's pulfe low after the operation, he applies blifters to the arms, which effectually raife his fpirits. 2. If the wound grows callous, he lays on a piece of blifter plafter to erode it, by which new flefh pullulates, and the wound unites. 3. If the wound be putrid, he mixes a little verdigreafe with fome digeftive ointment.

Women are lefs fubject to the ftone in the bladder than men, and their urinary paffages are more fhort and lax, fo that in general, the ftone being but fmall, difcharges itfelf with the urine, and when it happens to increafe in the bladder, we have inftances of its coming away fpontaneoufly.

LITHOZUGIA, in natural hiftory, a genus of foffils, of the clafs of the Scrupi, compofed of a fimple matter, making a kind of cement, and holding firmly together fmall pebbles, &c. embodied in it.

There are two kinds of the lithozugia. 1. That of a cryftalline bafis and purer texture, approaching to the nature of flint, called by the Englifh lapidaries, the pudding ftone: of this kind are reckoned four fpecies; the yellowifh white lithozugium, the greyifh white lithozugium, the red lithozugium, and the brownifh lithozugium, all filled with pebbles. 2. The lithozugia of a coarfer texture, approaching to the nature of the quarry ftone: of this kind there are alfo reckoned four fpecies, viz. the frefh-coloured lithozugium, filled with redifh, impure, cryftalline nodules; the blueifh, glittering lithozugium, filled with white, impure, cryftalline nodules; the whitifh, green, elegant lithozugium, filled with cryftalline nodules; and the friable, pale, red lithozugium, variegated with white veins and red nodules.

LITURGY, a name given to thofe fet forms of prayer which have been generally ufed in the Chriftian church. Of thefe there are not a few afcribed to the apoftles and fathers, but they are almoft univerfally allowed to be fpurious.

The modern liturgies are diverfified according to the diverfity of nations profeffing the Chriftian religion. Of thefe there are the Armenian liturgy, compofed by one of their patriarchs, named John; that of the Cophti or Chriftians of Egypt, written in the Cophtick or Egyptian language: the Æthiopian liturgy, written in the old Æthiopick tongue, faid to be written by Diofcorus, patriarch of Alexandria; the Greeks have four liturgies, viz. thofe of St. James, St. Mark, St. John Chryfoftom, and St. Bafil; but they ordinarily read only the latter, the liturgy of St. James being read only at Jerufalem, and that of St. Mark only at Alexandria: the Syriack liturgies are much more numerous than the Greek; for father Simon tells us, that the Jacobites reckon up forty different liturgies, all under different names. The miffal of the Maronites contains twelve liturgies, under the names of St. Xyftus, pope; St. John Chryfoftom; St. John the evangelift; St. Peter, the apoftle; St. Dionyfius; St. Cyril; Matthew, the paftor; John, patriarch; St. Euftathius; St. Maruta; St. James, the apoftle; St. Mark, the evangelift; and a fecond of St. Peter: and the Neftorians have three liturgies, that of the twelve apoftles, that of Theodofius, furnamed the interpreter, and a third under the name of St. Neftorius.

The liturgy of the church of England was compofed in the year 1547, fince which time it has undergone feveral alterations, the laft of which was in the year 1661, and of this liturgy Dr. Comber gives the following character. "No church was ever bleffed with fo comprehenfive, fo exact, and fo inoffenfive a liturgy as ours: which is fo judicioufly contrived, that the whole may exercife at once their knowledge and devotion; and yet fo plain, that the moft ignorant may pray with underftanding; fo full, that nothing is omitted, which ought to be afked in publick; and fo particular, that it comprifeth moft things which we would afk in private; and yet fo fhort, as not to tire any that have true devotion. Its doctrine is pure and primitive; its ceremonies fo few and innocent, that moft of the Chriftian world agree in them: its method is exact and natural, its language fignificant and perfpicuous, moft of the words and phrafes being taken out of the holy fcripture, and the reft are the expreffions of the firft and pureft ages." And in the opinion of the moft impartial and excellent Grotius, (who was no member of, nor had any obligation to, this church) "the Englifh liturgy comes fo near the primitive pattern, that none of the reformed churches can compare with it." Again, he fays, "In the prayers, a fcholar can difcern clofe logick, pleafing rhetorick, pure divinity, and the very marrow of the ancient doctrine and difcipline; and yet all made fo familiar, that the unlearned may fafely fay, Amen."

LITUUS, in Roman antiquity, a fhort ftraight rod only bending a little at one end, ufed by the augurs. The appellation lituus is alfo given to a mufical inftrument of the wind kind, ufed in the Roman armies; probably from its refemblance to the facred rod of the augurs.

LIVER, *Hapar*, in anatomy, a very large vifcus, of a red colour, fituated in the right hypochondrium, and ferving for the fecretion of the bile or gall. Its figure is irregular;

irregular; the upper surface being convex, smooth, and equal; the lower, hollow and unequal. There is also a remarkable eminence called the porta, just where the vena portæ enters it. In the liver we are also to observe the capsule of Glissonius, its discoverer; which includes the branches of the vena portæ, and the biliary ducts, as they approach the liver, as well as within it. The vessels of the liver are very numerous; receiving arteries from the cœliack, cysticks, diaphragmaticks, &c. veins, from the vena portæ, vena cava, and diaphragmatick vein; and nerves from the plexus hepaticus of the intercostals. The biliary vessels are the ductus choledocus communis, which opens obliquely into the duodenum; the ductus cysticus, which runs from the gall-bladder to the common duct; and the ductus hepaticus, which runs from the liver to the common duct; and the branches of this distributed through the liver, make what are called pori biliarii. The lymphatick vessels of the liver are to be demonstrated either by a ligature of the vena portæ in living animals, or by inflation into the artery, or hepatick duct, in dead ones. To these vessels we may add the canalis venosus, and the great sinus of the vena portæ in the fœtus.

The substance of the liver was, by the ancients, supposed to be formed merely of blood, concreted into a firm mass: Malpighi, and many of the later writers, have determined it to be glandulous; and Ruysch makes it vasculous, declaring it to be formed of a congeries of very minute vessels.

Plate XLVIII. *fig.* 2, 4. exhibits the liver freed from its parenchyma.

Fig. 4. represents the flat part of the liver, together with the most conspicuous vessels in it. A, that part of the liver which lies next to the back. B, its right side. C, its anterior edge. D, its left side. E, the vena cava, where it passes through the diaphragm. E, 1, E 2, E 3, its three principal branches distributed almost through the whole liver. F, the vena portæ turned upwards, that other vessels may be the more easily seen. F 1, F 2, F 3, F4, four branches of the vena portæ distributed to several quarters of the flat part of the liver, but the fifth branch is not observed on this side. G, the gall-bladder. H, H, the vena umbilicalis become a ligament. I, the ductus communis choledochus. K, the canalis venosus now performing the office of a ligament. L, the trunk of the vena cava descendens. *a*, A small portion of the membrane investing the liver. *b*, that part of the diaphragm which surrounds the vena cava. *c*, the biliary duct. *d*, the cystick duct. *e*, the place where the vessels meet. *f*, the hepatick artery. *o*, *o*, the hepatick nerves. *p*, *p*, *p*, *p*, the common capsula laid open. *q*, *q*, the lymph-ducts. *m*, *m*, *m*, &c. the smaller branches of the vena portæ. *n*, *n*, *n*, &c. the small branches of the vena cava.

Fig. 2. represents the convex part of the liver, together with the vessels situated in it. A, the superior part of the liver which lies next to the back. B, its right part C, its lower interior part. D, the left part of the liver. E, the trunk of the vena cava above the diaphragm. F, the sinus of the vena portæ. F 1, F 2, F 3, F 4, four branches of the vena portæ distributed in four different directions through the liver. F 5, the fifth branch of the vena portæ, which could not be described in the preceding figure. G, the gall-bladder. H, H, the umbilical vein. I, the ductus communis choledochus. *a*, *a*, *a*, *a*, the small ramifications of the fifth branch of the vena portæ cut off, that the other vessels may be the more distinctly seen. *b*, that portion of the diaphragm where it is joined to the vena cava. *c*, the biliary duct. *d*, *d*, the cystick duct. *e*, the angle where these vessels are joined. *m*, *m*, *m*, &c. the smaller branches of the vena portæ. *n*, *n*, *n*, &c. the smaller branches of the vena cava.

Fig. 3. A, the convex part of the liver. B, its right part. C, the concave part of the liver. D, its left part. E, the trunk of the vena portæ turned upwards, that the other vessels may be the more easily seen. 1, 2, 3, 4, 5, the five larger branches of the vena portæ. F, the ductus communis choledochus. G, the biliary duct, and its first division. H, the cystick duct. I, the gall-bladder. *a*, *a*, *a*, *a*, &c. the common capsula laid open. *b*, *b*, *b*, *b*, *b*, the subdivisions of the biliary duct.

Liver *of Antimony*, the same which the chymists call crocus metallorum, a preparation of antimony, made in the following manner: Take of antimony one pound, nitre 14 ounces, and common salt two ounces; powder them finely, and mix them well: set a crucible in the fire, and when it is red hot put in the mixture, by a spoonful at a time; when all is in, shut the door of the furnace. Let the matter stand in a strong fusion half an hour; then take it from the fire, and cast it into a warm greased mortar. Its operation is emetick; but the infusion of it in white wine or canary is generally used, one ounce of the crocus, in powder, being put into a quart of wine; which is given from an ounce to four ounces.

LIVERY, in law, the delivery of possession to those tenants which held of the king in capite, or by knights service.

Livery *of Seisin*, is a delivery of possession of those tenants, or things corporeal, to him who hath right, or probability of right to them.

LIVRE, a French money of account, consisting of twenty sols; each sol containing twelve deniers.—The livre is of two kinds, Tournois and Parisis.

Livre *Tournois* contains twenty sols Tournois, and each sol twelve deniers Tournois.

Livre *Parisis*, is twenty sols Parisis, each sol Parisis being worth 12 deniers Parisis, or 15 deniers Tournois. So that a livre Parisis is worth 25 sols Tournois. The word Parisis is used in opposition to Tournois, because of the rate of money, which was one fourth higher at Paris than at Tours.

LIXIVIOUS, *lixiviate*, in chymistry, such salts as are extracted from the ashes of burnt vegetables by means of lotion.

LIXIVIUM, a lye, or water impregnated with the salts of burnt vegetables. What is left after the evaporation of such a liquor is called a lixivious salt. Lixiviums are of great use in medicine, bleaching, sugar-works, &c.

LOADSTONE. See Magnet.

LOAM, the common superficial earth, consisting of clay, with a small admixture of sand. It also denotes a sort of mortar made of a redish earth, by tempering it with mud-water, straw, &c

LOBBY, or Antichamber, in building, an outer chamber before the principal room of an apartment, where servants and strangers wait till the person to be spoken with is at leisure, &c.

LOBE, in anatomy, denotes each of the two parts of which the lungs consist. It is likewise applied to the divisions of the liver.

Lobe is likewise applied to fruit and grain, as the bean consists of two lobes that compose the body thereof; and all grains, even the smallest, have two lobes.

LOBULE, *Lobulus*, *Lobellus*, a little lobe. Thus the cells of fat are called lobuli adiposi; and the extremeties of the bronchia, which end in little knobs, are called lobuli pulmonum: and even each lobe of the lungs is divided into several less ones, that consist of a great number of little round vesicles which communicate with one another.

LOCAL, something supposed to be annexed or peculiar to a particular place.

Local *Medicines*, *Localia Medicamenta*, in physick, such medicines as are destined to operate upon particular parts; or, more frequently, they denote external applications.

Local *Problem*, in the mathematicks, such a problem as is capable of an infinite number of different solutions, as the point that is to solve it, may be indifferently taken within a certain extent; which is called a geometrical locus. Such a problem may be either simple, as when the point sought is a right line; plane, when it is in the circumference of a circle; solid, when in the circumference of a conick section; or sursolid, when in the perimeter of a line of a higher kind.

Local *Colours*, in painting, such as are proper to each object in a picture, in contradistinction to clair obscure, which consists wholly of black and white.

LOCALIS Membrana, in anatomy, the same with pia mater. See Brain.

LOCATION, in civil law, an act by which any thing

thing is let out upon rent: conduction denoting the action of him who takes it on.

Tacit LOCATION, when the person who takes, continues on the premises beyond the term of his lease, which one may do, by the civil law, for a year on the same terms.

LOCH, or *Lohoch*, in pharmacy, a composition of a middle consistence, between a sirup and a soft electuary; chiefly used for diseases of the lungs. The word is originally Arabick. The Latins call it *linctus*, and the Greeks εκλειγμα, by reason the manner of taking it is by licking.

LOCHIA, in physick, the purgations of the uterus after child-birth. These consist, generally, for the two first days, of a kind of bloody serosity, and gradually become more white, viscous, and less in quantity; which, during the whole time, cannot be determined, some women having more, others less: nor can the duration of the flux be limited to any particular time.

The lochia sometimes flow in too large quantities, either on account of something retained in the uterus, which prevents it from contracting duly; or a too great fluidity or agitation of the blood. If it proceed from a retention of something in the uterus, this must, if possible, be taken away by the hand. But if it proceed from a too great fluidity or agitation of the blood, temperating decoctions of barley, jellies, emulsions, opiates, and astringents, are to be administered.

But when a deficiency in the lochia, or their utter suppression, happens, all possible means should be used to procure this salutary discharge. For this purpose mild anti-acids, diluters, and aperients, are to be exhibited. But great stress is to be laid on aperient and relaxing topicks, clysters, fomentations, plasters, liniments, cupping on the inferior parts, pessaries and suppositories.

Boerhaave advises not to let blood in the above-mentioned disorders, without the utmost necessity.

LOCK, an instrument used for fastening doors, chests, &c. generally opened by a key. The lock is esteemed the master-piece in smithery; much art and delicacy being required in contriving and varying the wards, bolts and springs. From the different structure of locks, accommodated to their different uses, they acquire different names: thus those placed on outer doors are called stock-locks; those on inner doors, spring-locks; those on trunks, trunk-locks, padlocks, &c. Of these the spring-lock is the most curious: its principal parts are, the main-plate, the cover-plate, and the pin-hole: to the main-plate belong the key-hole, top-hook, cross-wards, bolt-toe or bolt-nab, drawback-spring, tumbler, pin of the tumbler, and the staples; to the cover-plate belong the pin, main-ward, cross-ward, step-ward or dapper-ward; to the pin-hole belong the hook-ward, main cross-ward, shank, the pot or bread, bit, and bow-ward.

LOCUS GEOMETRICUS, in geometry, denotes a line, by any point of which a local or indeterminate problem is solved. If a right-line suffice for the construction of the equation, it is called locus ad rectam; if a circle, locus ad circulum; and these were called plain loci; if a parabola, hyperbola, locus ad parabolam, hyperbolam, &c. and those were called solid loci.

Wolfius and the moderns more commodiously divide loci into orders, according to the number of dimensions to which the indeterminate quantities rise.

When in an equation there are two indetermined quantities x and y, then for each particular value of x there may be as many values of y as it has dimensions in that equation. So that if A P, a part of the indefinite line A E, represent x, and the perpendiculars P M (*plate* LVIII. *fig.* 1.) represent the corresponding values of y, then there will be as many points M, the extremities of these perpendiculars or ordinates as there are dimensions of y in the equation. And the values of P M will be the roots of the equation arising by substituting for x its particular value A P in any case. From whence it appears, how, when an equation is given, you may determine as many of the points M as you please, and draw the line that shall pass through all these points; which is called the locus of the equation. When any equation involving two unknown quantities, x and y, is proposed, then substituting for x any particular value A P, if the equation that arises has all its roots positive, the points M will lie on one side of A E; but if any of them are found negative, then these are to be set off on the other side of A E towards m. If for x, which is supposed undetermined, you substitute a negative quantity, as A p, then you will find the points M, m, are taken in, that it may shew all the values of y, corresponding to all the possible values of x. If, in any case, one of the values of y vanish, then the point M coincides with P, and the locus meets with A E in that point. If one of the values of y become infinite, then it shews that the curve has an infinite arch: and in that case the line P M becomes an asymptote to the curve, or touches it at an infinite distance, if A P is itself finite. If, when x is supposed infinitely great, a value of y vanish, then the curve approaches to A E produced as an asymptote. If any values of y become impossible, then so many points M vanish. From what has been said, it appears that when an equation is proposed involving two undetermined quantities, x and y, there may be as many intersections of the curve, or locus of the equation, and of the line P M, as there are dimensions of y in the equation; and as many intersections of the curve and the line A E as there are dimensions of x in the equation.

LOCUST, *Locusta*, a genus of insects, comprehending the locust, simply so called, the several species of other locusts and grashoppers, with the crickets of the house and field.

Water LOCUST, *Locusta Aquatica*, the name given by authors to a species of water insect, somewhat resembling the locust kind in shape. It is about three inches long, its tail an inch and a quarter, and its legs are of different lengths; the anterior part being shortest of all. Its body is slender, and its fore legs are always carried straight forward, so as to reach beyond the head in the form of antennæ. These, as well as the other legs, end each in two claws. The eyes are small, and not very prominent; and the upper wings are crustaceous, the under ones membranaceous, thin, and transparent. The middle joint of the leg is such, that the creature can only move them upwards, not downwards; and there runs an acute tongue or proboscis under the belly, as is the case of the water scorpion and notonecta.

LOCUST-TREE, in botany, a species of acacia. See ACACIA.

LOCUSTÆ, in botany, the tender extremities of the branches of trees, such as, it is supposed, St. John Baptist fed on in the wilderness.

LODGMENT, in military affairs, is a work raised with earth, gabions, fascines, wool-packs or mantelets, to cover the besiegers from the enemy's fire, and to prevent their losing a place which they have gained, and are resolved, if possible, to keep. For this purpose, when a lodgment is to be made on the glacis, covert-way, or in a breach, there must be great provision made of fascines, sand-bags, &c. in the trenches; and during the action, the pioneers with fascines, sand-bags, &c. should be making the lodgment, in order to form a covering in as advantageous a manner as possible from the opposite bastion, or the place most to be feared.

LOEFLINGIA, in botany, a genus of the triandria monogynia class. The calix consists of five leaves, and the corolla of five small petals; and the capsule has one cell, and three valves. There is but one species, a native of Spain.

LOESELIA, in botany, the name of a genus of plants, called also *royenia* by Houston. The calix consists of four segments; and the capsule has three cells. There is but one species, a native of America.

LOG, in the marine, a machine used to measure the ship's way through the sea.

It is composed of three parts, viz. the reel, the line, and a little board formed like the quadrant of a circle, and nearly resembling the shape of those quadrants employed to take the altitude of a tree, steeple, or other object. The term log, however, is more particularly confined to this last. This piece of board is generally from five to six inches in the radius, and a quarter of an inch in depth: and round the arching edge of it, is nailed a thin plate of lead, of sufficient weight to make the log swim perpendicularly in the water, and so as that nearly two-thirds of it may be immersed under the surface. In the middle of the arch, about a quarter of an inch within the edge, is bored a small hole, and another within the angular point: through this last is inserted

the end of a piece of line, which being knotted on the other ſide, is drawn tight back to the hole: to the other end of this ſmall cord, which is about two feet long, is faſtened a pin, which is thruſt into the other hole: the log being then ſuſpended horizontally, the line is faſtened to the middle of this ſmall ſtring, ſo that the pin can occaſionally be taken out, and will eaſily come out of itſelf when it meets with any reſiſtance.

Log-*Line*, a line faſtened to one end of the log, and wound upon a reel. This line is generally divided into certain ſpaces, which are, or ought at leaſt to be, ſuch a proportional part of a nautical line, 60 of which make a degree of a great circle, as half a minute, the time allowed for the experiment, is of an hour. Now a common nautical or ſea mile, according to an experiment made by Mr. Richard Norwood, and with which the French nearly agree, is =6120 Engliſh feet, which being divided by 120, the half minutes in an hour, gives 51 feet for the diſtance between each diviſion on the log-line. Theſe diviſions or ſpaces are called knots, becauſe at the end of each diviſion there is a piece of twine with knots in it reefed between the ſtands of the line: whereby the number of diviſions or knots run off the reel, during the half minute, are readily counted.

And becauſe it is requiſite that the log be out of the eddy of the ſhip's wake before they begin to count, therefore theſe knots or ſpaces begin at the diſtance of 10 fathoms or 60 feet from the log; at which point, for the more ready diſcovering it, there is faſtened a piece of red rag. The log-line being thus prepared and wound upon a reel, heave the log over-board from the poop; and as ſoon as the log is out of the ſhip's eddy, or the red rag at your hand, let your aſſiſtant turn the half minute glaſs; then veer the line from off the reel, which eaſily turns, as the ſhip ſails from the log, till the half minute glaſs is run out; at which time ſtop the line, and the number of knots intercepted between your hand and the red rag, will ſhew how far the ſhip has run in that time, and, conſequently, her rate of ſailing. For ſince the diſtance, comprehended between each knot, bears the ſame proportion to a nautical line as half a minute does to an hour: therefore as many knots as are run out in half a minute, ſo many miles will the ſhip ſail in an hour; ſuppoſing her to move with the ſame velocity, during that time.

But as many accidents attend a ſhip during a day's ſailing, ſuch as the variableneſs of winds, the different quantity of ſail carried, &c. it will be neceſſary to heave the log at every alteration; but if none of theſe alterations be perceptible, yet it ought to be conſtantly heaved, at leaſt every hour. As the log-line is apt to ſtretch and ſhrink, and the half minute glaſs to alter, they ought to be often examined, and when found amiſs, rectified.

The generality of our ſeamen, upon a ſuppoſition that 60 Engliſh miles are equal to 1° of a great circle, make the diſtance between knot and knot but 40 feet; but as this ſuppoſition is evidently falſe, it were greatly to be wiſhed that they would conſtantly uſe the former limitation, being in every reſpect as eaſy, and much more ſure and certain; and the rather, as they are at the ſame time obliged by experience to ſhorten the half minute glaſs nearly four ſeconds, which is nothing leſs than correcting one blunder by another.

Log-Board, a ſort of table divided into ſeveral columns, containing the hours of the day and night, the courſes the ſhip has run, the winds, and all the material occurrences that happen in the 24 hours, or from noon to noon; together with the latitude by obſervation. From this table the ſeveral officers of the ſhip copy the materials, and tranſcribe them, with what additions they can recollect or may think neceſſary to remark in their journals after their own manner.

Log-Book, a book into which the above articles are daily copied, together with every thing material that happens to the ſhip, or is obſerved either at ſea or in a harbour. The diviſions or watches of it, conſiſting of four hours each, are ſigned by the lieutenant or commanding officer of the watch in a ſhip of war or an Eaſt India-man.

Log-Wood, or Campeachy wood, is the wood of a low prickly tree, which grows plentifully about Campeachy, or the Bay of Honduras.

Log-wood gives out its colour both to watery and ſpirituous menſtrua, but not readily to either: it requires to be raſped and ground into fine powder, and boiled in ſeveral freſh parcels of the liquors. Rectified ſpirit extracts the colour more eaſily, and from a larger proportion of the wood than water does.

The tinctures both in water and in ſpirit are of a fine red, with an admixture, particularly in the watery one, of a violet or purple. Volatile alkaline ſalts, or ſpirits, incline the colour more to purple: the vegetable and nitrous acids render it pale; the vitriolick and marine acids deepen it.

LOGARITHMICK, or Logarithmical, ſomething relating to, or partaking of, the nature of logarithms.

Logarithmick *Curve*, a curve which explains the nature and properties of logarithms. It is conſtructed in the following manner: Upon the line A G (*plate* XLIX. *fig.* 3.) infinitely extended each way, let there be taken A B, B C, C D, D E, E F, &c. towards the right hand; alſo A O, O P, &c. towards the left, all equal among themſelves; and from the ſeveral points P, O, A, B, C, D, E, F, &c. let there be drawn the lines R P, O Q, A H, B I, C K, D L, E M, F N, &c. equal in length to the ſeveral lines, in the geometrical ſcale of proportional lines, infinite in number; theſe therefore will repreſent ſo many terms in the progreſſional of proportionals, of which the line A H repreſents unity. Now if the extremities R, Q, H, I, K, L, M, N, &c. of the geometrical ſcale of mean proportionals be connected together by right lines, the figure P R N F will be a polygon, conſiſting of more or fewer ſides, according as the terms in the ſcales of mean proportionals are more or fewer in number.

If the diſtances A B, B C, D E, E F, &c. are biſſected in the points *b*, *c*, *d*, *e*, *f*, &c. and from theſe points be drawn lines, as *b i*, *c k*, *d l*, *e m*, *f n*, &c. perpendicular to A G, which will be ſo many proportionals between A H, B I, C K, D L, E M, F N, &c. there will ariſe a new ſcale for a ſeries of proportionals between A H, B I, C K, D L, E M, F N, &c. double in number to thoſe of the former ſcale. And if the extremities H, *i*, I, *k*, K, *l*, L, &c. be connected together by right-lines, we ſhall have a new polygon, conſiſting of a great number of ſides; but each ſide leſs in magnitude.

After the ſame manner, if the diſtance between every two terms be continually biſſected; and to each of the points ſo found there be applied a ſeries of mean proportionals, the number of terms in this ſcale, as alſo the ſides of the polygon, will, by this means, become infinite; and each ſide of the polygon will be leſs than any given right-line, and conſequently the polygon will be changed into a curve-lined figure; ſince every curvilinear figure may be conſidered as a polygon of an infinite number of ſides. The curve thus deſcribed is called the logarithmick curve; in which, if the right-lines A H, B I, &c. which ſtand at right-angles to the axis A G, repreſent ſo many terms in a ſeries of numbers in geometrical progreſſion, the portions of the axis A B, B G, &c. between the place of unity and any given term, will ſhew the place or order that each number in the ſcale of geometrical proportionals obtains from the place of unity in the ſame ſeries. The diſtance therefore between any two numbers, in this continued ſcale of geometrical proportionals, is the logarithm of the ratio of theſe two numbers the one to the other. See Logarithms.

Logarithmick *Spiral*. If the quadrant of a circle A N B (*plate* XLIX. *fig.* 6.) be divided into any number of equal parts, in the points N, *n*, *n*, &c. and from the radii C N, C *n*, C *n*, &c. be cut off C M, C *m*, C *m*, &c. continual proportionals, the points M, *m*, *m*, *m*, &c. will be in the logarithmick ſpiral. And there may be imagined an infinite number of different curves of this kind.

LOGARITHMS, a ſet of artificial numbers, ſo proportioned among themſelves, and adapted to the natural numbers, as to perform the ſame things by addition and ſubtraction, as the latter do by multiplication and diviſion. The word is formed from the Greek λόγος, ratio; and ἀριθμός, number. Logarithms, juſtly eſteemed one of the greateſt and moſt uſeful diſcoveries that the laſt century has produced, were firſt invented by John Neper, baron of Marchiſton in Scotland, and by him

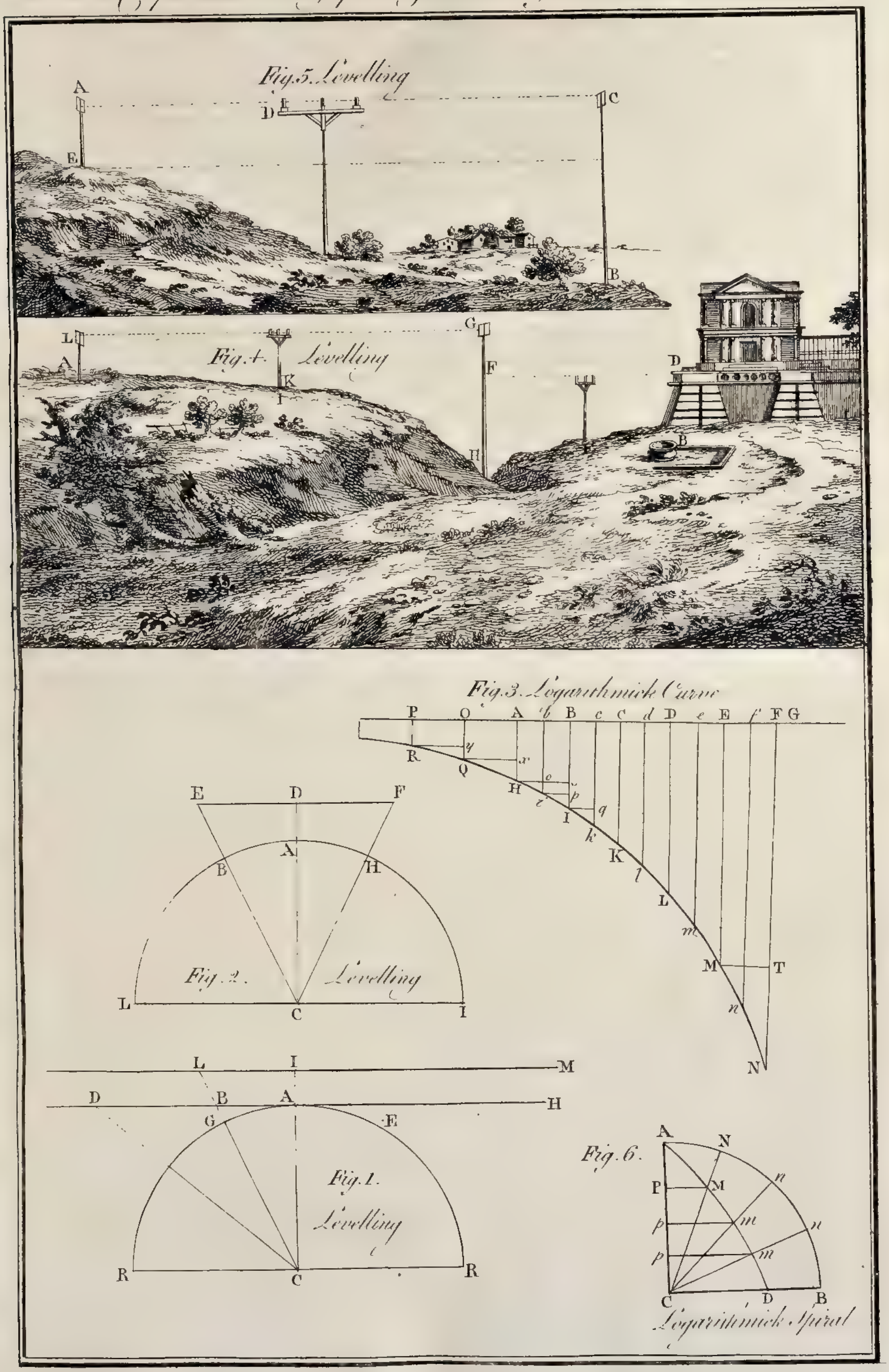


Plate XLIX

facing Logarithmick Curve.

him firſt publiſhed at Edinburgh in the year 1614, and ſoon after by himſelf and Mr. Briggs (then Savilian profeſſor of geometry in the univerſity of Oxford) reduced into a better form, and publiſhed in London in the year 1624, in the ſame form and manner as they are uſed at this day.

Logarithms may be conſidered as, and are uſually defined to be, a ſeries or rank of numbers in an arithmetical progreſſion, fitted or adapted to a ſeries of numbers in a geometrical progreſſion; that is, if to a rank of continual proportionals in a geometrick progreſſion, from 1 ſuppoſe, 1, 2, 4, 8, 16, 32, 64, 128, &c. be accommodated a rank of numbers, continually proportional in an arithmetical progreſſion beginning from 0. Suppoſe, 0, 1, 2, 3, 4, 5, 6, 7, &c. inſomuch as, for every multiplication or diviſion of the terms in the geometrical progreſſion, there is an anſwerable addition or ſubtraction of the correſpondent terms in the arithmetical progreſſion; that is, as 2, the ſecond term in the geometrick ſeries, multiplied by 4, the third term, produces 8, the fourth term in the ſame ſeries; ſo 1, the ſecond term in the arithmetick ſeries, added to 2, the third term, produces 3, the fourth term in the ſame ſeries; and again as 16, the fifth term in the geometrick ſeries, divided by 2, the ſecond term, produces 8, the fourth term in the ſame ſeries; or univerſally, if inſtead of 2, the ſecond term in the geometrick ſeries, we ſubſtitute x, and, in the room of 1, the ſecond term in the arithmetical ſeries, we ſubſtitute a, that is, if to a ſeries of geometrical mean proportionals as,

$$1,\ x,\ xx,\ x^3,\ x^4,\ x^5,\ x^6,\ x^7,\ \&c.$$

be accommodated a ſeries of arithmetical mean proportionals, as, $0,\ a,\ 2a,\ 3a,\ 4a,\ 5a,\ 6a,\ 7a$, &c. inſomuch as the multiplication of any two terms in the geometrick ſeries, as x and x^2, produces the term x^3, which anſwers or correſponds to the term $3a$ in the arithmetick ſeries, the ſum of the terms a and $2a$ in the ſame ſeries, and the diviſion of any two terms in the firſt ſeries as x^3 by x, produces x^2, which correſponds with the term $2a$ in the ſecond ſeries, the difference between the correſpondent terms $3a$ and a in the ſame ſeries; and inaſmuch as this is the eſſential property of the logarithms, therefore, the terms in the latter ſeries are the logarithms of their correſpondent terms in the firſt ſeries; and becauſe the terms a and x may ſtand for any numbers taken at pleaſure, therefore logarithms may be of as many different ſorts as there can be aſſumed different values of the quantities x and a.

If the quantity a in the ſecond ſeries be put equal to 1, then the ſeveral terms of the ſecond ſeries, viz. 0, 1, 2, 3, 4, 5, 6, 7, &c. become the indices or exponents of the ſeveral reſpective terms or powers in the firſt progreſſional ſeries of geometrical proportions whoſe firſt term is 1 and ſecond term x, inaſmuch as they point out the places or diſtances that each term obtains from unity; for example, as the number 5 in the ſecond ſeries ſtands againſt the quantity x^5 in the firſt ſeries, it points out and ſhews that the quantity x^5 is the fifth place from unity; in like manner, as the number 6 in the ſecond ſeries ſtands againſt x^6 in the firſt ſeries, it ſhews that the quantity ^6x is the ſixth place from unity, and that the quantity x is that which immediately follows: and hence it is that logarithms are ſometimes defined to be the exponents of indices of the powers of the reſpective numbers to which they belong.

In the progreſſional ſeries of geometrick proportionals, if between the terms 1 and x be inſerted a mean proportional, which is $\sqrt{x}$, its index will be $\frac{1}{2}$, inaſmuch as its diſtance from unity will be but one half of the diſtance of x from unity; and conſequently the root of x will be expreſſed by $\frac{1}{2}$: in like manner, if between x and x^2 we inſert a mean proportional, its index will be 1 and $\frac{1}{2}$ or $\frac{2}{3}$, inaſmuch as its diſtance from unity is one and a half the diſtance of x from the ſame place of unity.

Again, if between 1 and x be inſerted two mean proportionals, the firſt of theſe will be the cube root of x or $\sqrt[3]{x}$, and its index will be $\frac{1}{3}$, inaſmuch as its diſtance from the units place is but $\frac{1}{3}$ of the diſtance from x; from the ſame place of unity; and, conſequently, $\sqrt[3]{x}$ is expreſſed by $x^{\frac{1}{3}}$, whence it follows, that the index of unity is 0, inaſmuch as unity cannot be removed at any diſtance from itſelf.

And the ſame ſeries of geometrical proportionals may be continued on the contrary ſide of unity, or towards the left hand, and which therefore will decreaſe in the ſame manner, or in the ſame ratio, as the terms placed on the right hand increaſe.

For the terms, $\frac{1}{x^5},\ \frac{1}{x^4},\ \frac{1}{x^3},\ \frac{1}{x^2},\ \frac{1}{x},\ 1,\ x,\ x^2,\ x^3,\ x^4,\ x^5$, &c. are in the ſame geometrical progreſſion continued, and have all the ſame common ratio; wherefore, inaſmuch as the diſtance of x from unity towards the right hand is poſitive, or $+1$, the diſtance of $\frac{1}{x}$ from unity towards the left hand, which is equal to the former, is negative, or -1, which is therefore the index of $\frac{1}{x}$, and conſequently, for $\frac{1}{x}$ may be written x^{-1}.

Again, becauſe x^2 is on the right ſide of unity, and poſitive, and its index $+2$ the index of $\frac{1}{x^2}$, which is as far diſtant from unity on the contrary ſide, or towards the left hand, will be negative, and -2, and conſequently $\frac{1}{x^2}$ is the ſame with x^{-2}: in like manner x^{-3} is the ſame with $\frac{1}{x^3}$, and x^{-4} the ſame with $\frac{1}{x^4}$; whence it comes to paſs that the negative indices ſhew that the terms to which they belong, are as far diſtant from unity toward the left hand, as the terms whoſe indices are the ſame and poſitive, are removed from unity on the contrary ſide, or towards the right hand.

Again, as between 1 and x, in the ſeries in increaſing from or on the right hand of unity, may be inſerted a mean proportional as $\sqrt{x}$, and between this mean proportional and unity be inſerted another mean proportional, as $\sqrt[4]{x}$, and between the laſt mean proportional and unity be inſerted another mean proportional as $\sqrt[8]{x}$, &c. whoſe reſpective indices will be $\frac{1}{2},\ \frac{1}{4},\ \frac{1}{8}$, &c. ſo between unity and the next term $\frac{1}{x}$ in the ſeries decreaſing from unity, or on the left hand of unity, may be inſerted a mean proportional as $\frac{1}{\sqrt{x}}$, whoſe correſpondent index will be $-\frac{1}{2}$; and, again, between this mean proportional and unity, may another mean proportional as $\frac{1}{\sqrt[4]{x}}$ be inſerted, whoſe correſpondent index will be $-\frac{1}{4}$; and between this and unity may another mean proportional be inſerted; the index will be $-\frac{1}{8}$, &c. and, as this may be done between any other two terms of the progreſſion, it follows, that between any two terms may an infinite number of mean proportionals be inſerted, whoſe reſpective indices will become the logarithms of the reſpective terms to which they belong: and theſe mean proportionals, the greater they are in number between the two terms of any ratio, the nearer do they approach to a ratio of equality, with their correſpondent indices or exponents.

Hence we are let into the reaſon of the ancient way of making logarithms, and which was made uſe of by their firſt inventors, and that was to extract the ſquare root out of the ſquare root, &c. of any number, in order to find out a ſeries of continual mean geometrical proportionals; till the number of cyphers contained between unity and the firſt ſignificant figure of the root was equal to the number of places that the intended logarithm ſhould conſiſt of, and at the ſame time to find out a large number of correſpondent arithmetical means, which would be the true logarithms of the geometrical means reſpectively.

And how operoſe this method is, may be eaſily gueſſed at by any one who has been at the pains to extract the root of a large number; and may be gathered from this, that to find a logarithm to ſeven places only requires at leaſt 27 extractions of root out of root, the ſquare conſiſting of 16 figures at leaſt; and that, if in any one of the operations an error happens to creep in, the whole work muſt be repeated.

Some have conſidered the logarithm of a number as the logarithm of the ratio of unity to that number itſelf,

ſelf, or as the diſtance between unity and that number in a geometrical ſcale of proportionals, and conſequently meaſured by the number of proportionals contained between them: logarithms therefore expound the place or order that every number obtains from the unit's place in a continued ſeries or ſcale of proportionals indefinite in number.

Thus, if between unity and the number 10, there be ſuppoſed 10000000, &c. mean proportionals, that is, if the number 10 be placed in the 10000000th place from unity, between 1 and 2, there will be found 3010300 of ſuch proportionals; that is, the number 2 will be placed in the 3010300th place from unity; between 1 and 3 there will be found 4771213 of the ſame proportionals, or the number 3 will ſtand in the 4771213th place in the indefinite ſcale of proportionals; their numbers 10000000, 3010300, and 4771213, are therefore the logarithms of 10, 2, and 3; or, more properly the logarithms of the ratios of thoſe numbers one to the other.

Again, if between unity and the number 10, there be ſuppoſed an indefinite ſcale of mean proportionals, whoſe number is 23025851; that is, if the number 10 be placed in the 23025851ſt place from unity, in the indefinite ſcale of proportionals, between 1 and 2, there will be found to be 6931471 ſuch mean proportionals; and between 1 and 3, there will be found 10986122 of the ſame proportionals: ſo that if the firſt term of the ſeries be called x, the ſecond term will be x^2, the third x^3, &c. and if the number 10 be ſuppoſed to be the 10000000th term in the ſeries, the number 2 will be the 3010300th term, and the number 3 will be the 4771213th term in the ſame ſeries; and conſequently $x^{10000000}=10$, $x^{3010300}=2$, and $x^{4771213}=3$, &c. and again, if the number 10 be ſuppoſed the 23025851ſt term in the ſeries, the number 2 will be the 6931471ſt term, and the number 3 the 10986122d term in the ſame ſeries; and conſequently, in this caſe, $x^{23025851}=10$, $x^{6931471}=2$, and $x^{10986122}=3$, &c.

And as the indefinite number of mean proportionals betwixt any two numbers may be aſſumed at pleaſure, hence logarithms may be of as many different forms (that is, there may be as many different ſcales of logarithms) as there can be aſſumed different ſcales of mean proportionals between any two numbers. Every number therefore is ſome certain power of that number which is placed next to unity in the indefinite ſcale of proportionals between unity and the given number, and the index of that power is the logarithm of the number.

Logarithms therefore may be of as many ſorts as you can aſſume different indices of the power of that number whoſe logarithm is required.

But ſince fluxions and the higher geometry have been ſo well underſtood, mathematicians have directed their views towards facilitating thoſe laborious and operoſe calculations formerly made uſe of for conſtructing tables of logarithms, by help of converging ſeries, and other means, whereby the logarithms of any propoſed numbers may now be obtained with very little trouble: an example of this kind may be ſeen in MacLaurin's Fluxions, volume ii. page 678, where that celebrated mathematician ſhews that the logarithm of m being given, the logarithm of $\overline{m+z}$—log. m is equal to $\frac{2z}{2m\times z}$ multiplied by the ſeries $1-\frac{z}{12}\times\frac{1}{\overline{m\times z}}-\frac{1}{m}\times\frac{z^3}{360}\times\frac{1}{\overline{m+z}^3}-\frac{1}{m^3}-\frac{z^5}{1260}\times\frac{1}{\overline{m+z}^5}-\frac{1}{m^5}$, +, &c. &c. This ſeries converges ſo very ſwift, that two or three terms are ſufficient in almoſt any caſe whatſoever.

The indices, or characteriſticks of logarithms, correſpond to the denominative part of the natural numbers, as the other member of the logarithm does to the denominative part of the number: that is, the index ſhews the denomination, or place of the laſt (or left hand) figure of the number, and conſequently of all the reſt. Thus 0, affixed to a logarithm, denotes the laſt figure of the number, to which the logarithm anſwers, to be nothing diſtant from (i. e. in) the place of units. The index 1 ſhews the laſt figure of its number to be diſtant 1 place from the place of units, i. e. to be in the place of tens, and conſequently the number itſelf to be either 10, or ſome number between that and 100, and ſo of the other indices. Hence all numbers, which have the ſame denomination, but not the ſame numerative parts, are all numbers from 1 to 10, from 10 to 1000, &c. and will have logarithms whoſe indices are the ſame, but the other members different. Again, all numbers which have the ſame numerative, but not the ſame denominative part, will have different indices, but the reſt of the logarithms the ſame. If a number be purely decimal, to its logarithm is affixed a negative index, ſhewing the diſtance of its firſt real figure, from the place of units. Thus the logarithm of the decimal ,256 is $\bar{1}$,43824; of the decimal ,0256 is $\bar{2}$,30824, &c.

To find the logarithm for a number greater than any in the common tables, but leſs 10000000—cut off four figures on the left hand of the given number, and ſeek the logarithm in the table; add as many units to the index, as there are figures remaining on the right; ſubtract the logarithm found, from the next following it, in the table; then, as the difference of numbers in the canon is to the tabular difference of the logarithms anſwering to them, ſo are the remaining figures of the given number to the logarithmick difference; which, if it be added to the logarithm before found, the ſum will be the logarithm required. Suppoſe the logarithm of the number 92375 were required; cut off the four figures 9237, and to the characteriſtick of the logarithm correſponding to them, add an unit; then,

From the logarithm of the number	9238=3,9655780
Subtract logarithmick number —	9237=3,9655309
Remains tabular difference — —	471

10—471—5
5) 2 — — 1
235

Now to the logarithm - - -	4,9655309
Add the difference found - - -	235
The ſum is the logarithm required -	4,9655544

Similar to this is the method to find the number anſwering to a logarithm, which does not occur exact in the tables, e. g. 3,7589982. In order to find the number anſwering to this logarithm, firſt ſeek in the tables the next greater

from which ſubtract -	3,7590632=log. of 5742
the next leſſer - -	3.7589875=log. of 5741
Remains tabular difference	757
Then from the given logarithm - -	3,7589982
ſubtract the next leſſer - -	3,7589875
Remains ſecond difference - -	107

Laſtly 757—100—107—10700(14
100 757
10700 3130
3028
102

Now to 5741 add $\frac{14}{100}$, and thus you ſhall have the number required.

To find the logarithm of a proper fraction.—Subtract the logarithm of the numerator from that of the denominator, and to the remainder prefix the ſign of ſubtraction.—Thus, ſuppoſe it were required to find the logarithm of $\frac{3}{7}$,

Logarithm of 7=0,8450980
Logarithm of 3=0.4771213
Logarithm of $\frac{3}{7}$—0,3679767

To find the number correſponding to a logarithm greater than any in the table.—Firſt, from the given logarithm, ſubtract the logarithm of 10, or 100, or 1000, or 10000, till you have a logarithm that will come within the compaſs of the table; find the number correſponding to this, and multiply it by 10, or 100, or 1000, or 10000, the product is the number required. Suppoſe, for inſtance, the number correſponding to the logarithm 7,7589982 be required; ſubtract the logarithm of the number 10000, which is 4,0000000, from 7,7589982; the remainder is 3,7589982, the number correſponding to which is 5741,1, which, multiplied by 10000, gives 57411000, the number required.

To find the number correſponding to a negative logarithm.—To the given negative logarithm, add the laſt logarithm of the table, or that of the number 10000, i. e. ſubtract the firſt from the ſecond, and find the number correſponding to the remainder; this will be the numerator

numerator of the fraction, whose denominator will be 10000. Suppose it be required to find the fraction corresponding to the negative logarithm—0,3679767,
4,0000000
subtract this from 4,0000000, the remainder is 3,6320233, the number corresponding to which is 4285$\frac{71}{100}$; the fraction sought therefore is $\frac{428571}{10000000}$.—The reason of the rule is, that as a fraction is the quotient, arising from the division of the numerator by the denominator, unity will be to the fraction, as the denominator to the numerator; but as unity is to the fraction corresponding to the given negative logarithm, so 10000 to the number corresponding to the remainder: therefore if 10000 be taken for the denominator, the number will be the numerator of the fraction required.

LOGICK, the art of using reason well in our inquiries after truth, and the communication of it to others.

Cicero makes Socrates the author of logick, and we know that he made a system of all its precepts, and demonstrated the use of them in his familiar conversations, or what we call dialect. This we may find scattered up and down in the writings of his disciple Plato and others. As to method, Plato preferred that of the orator, as the most useful, which under a careless appearance conceals a great deal of art, by means of an agreeable air over all the discourse, seems the most proper for removing prejudices and allaying the passions.

Aristotle chose rather to use the method of the geometricians, which admits of no term but what was defined, nor of any axiom, that is not granted; and he reasoned from these in the conclusive form. He invented the syllogism, or at least gave the demonstration of all its figures in his analyticks. In short, he stopped at pure speculations, which for the most part are but weak helps for perfecting our reason. Cleanthes and Chrysippus afterwards stuffed logick full of quiddities and trifling subtilties. Their successors gave to many things, and to the different ways of conceiving them, strange names, which they were not at the pains to explain. This sort of logick was in after-times adopted by Occam and his disciples; and it was not improved by passing through the hands of the Arabians: and to the great shame of reason, it triumphed a long time in the schools. Edmund Richer, about the end of the sixteenth century, did all he could to bring logick out of that low condition into which the schoolmen and nominalists had brought it: his book, called Obstetrix Animorum, was the fore-runner of that admirable method of Descartes, which Malebranche, and all those who have come after, have endeavoured to illustrate.

For the proper use of true logick, we gain several very considerable advantages: for, 1. The consideration of rules incites the mind to a closer attention in thinking, so as to be assured that we make the best use of our faculties. 2. We hereby more easily and accurately discover the errors and defects in reasoning. And, 3. By these reflections on the order and manner of the operations of the mind, we are brought to a more just and complete knowledge of the nature of our own understanding.

LOGISTICK *Curve*, the same with logarithmick curve. See LOGARITHMICK.

LOGISTICK *Arithmetick*, the doctrine of sexagesimal fractions. See SEXAGESIMAL.

LONGÆVITY, length of life.

LONGIMETRY, the art of measuring length, both accessible and inaccessible.

LONGITUDE *of a Star*, in astronomy, an arch of the ecliptick, intercepted between the beginning of aries, and the point of the ecliptick cut by the star's circle of longitude. See CIRCLE, &c.

LONGITUDE *of a Place*, in geography, is an arch of the equator intercepted between the first meridian, and the meridian passing through the proposed place; which is always equal to the angle at the pole, formed by the first meridian and the meridian of the place.

The first meridian may be placed at pleasure, passing through any place, as London, Paris, Teneriffe, &c. but, among us, is generally fixed at London: and the longitudes counted from it will be either east or west, according as they lie on the east or west side of that meridian.

The difference of longitude between two places upon the earth is an arch of the equator comprehended between the two meridians of these places; and the greatest possible is 180°, when the two places lie on opposite meridians.

Since the parallels of latitude always decrease, the nearer they approach the pole, it is plain, a degree upon any of them must be less than a degree upon the equator, in the ratio of the co-sine of the latitude to the radius. Hence, as the radius is to the co-sine of any latitude, so is the minutes of difference of longitude between two meridians, or their difference in miles upon the equator, to the distance of these two meridians on the parallel of that latitude, in miles.

LONGITUDE, in navigation, is the distance of a ship or place east or west from another, counted in degrees of the meridian, and not in those proper to the parellel of latitude, it is usually called departure.

Since the difference of longitude between any two places is equal to the arch of the equator, intercepted between the two meridians passing through the two places; which is analogous to the quantity of time that the sun requires to move from the meridian of one place to that of another; or, in the language of the Copernicans, that is elapsed between the application of the meridian of one of the places to the sun and the meridian of the other; for since the sun finishes his diurnal revolution in the space of 24 hours; or, which is the same thing, since the revolution of the earth about her own axis is performed in the same time, it follows that in every hour there passes over the meridian one 24th part of 360°, or of the whole circumference of the equator, equal to 15°; in two hours, one 12th part, or 30°; and, in any greater, or less part of time, a proportional greater or less part of the equator; whence it follows, that if the difference of longitude, or arch of the equator, intercepted between the meridians passing through any two places, be known, the difference of the times of the day in those two places is known also; and, consequently, the hour in one place being known, the hour in the other place is known also; and, on the contrary, if the difference between the times at any two places be known, the difference of longitude between those two places is known also, by reducing the difference of the times into degrees and minutes, allowing 15° to an hour, &c.

Hence it is, that if two or more places lie under the same meridian, the hour in one will be the same with the hour in the other; and, on the contrary, if in two or more places the hour be the same, those places lie under the same meridian.

And because the sun in all places constantly rises in the east, he must necessarily apply himself to the meridian of the eastermost place first; and consequently, in that place that lies to the eastermost, the noon happens soonest; and the hour of the day or distance of the sun from the meridian at any other time must be greatest.

Whence it appears, that if, by any contrivance whatsoever, the hour of the day at the same point of absolute time in two different places can be obtained, the difference of longitude between those places is also known; and by comparing the times together, it is easy to pronounce which place of the two lies to the eastward or westward of the other.

Wherefore, if two or more persons can view the same appearance at two or more places, and pronounce the time at each place when such appearance was visible; or if the time when any notable appearance shall happen at any place be predicted, and the time when that appearance was visible at any other place was determined; these, times being compared together, will give the difference of meridians, or diffe.ence of longitude between the two places.

Now since an eclipse of the moon proceeds from nothing else but an interposition of the earth between her and the sun, by which means she is prevented from reflecting the light she receives from the sun, the moment that any part of her body begins to be deprived of the solar rays, it is visible to all those people who can see her at the same time; whence if two or more different people, at two or more different places, observe the times when it first began or ended, or note the time when any number of digits was eclipsed, or when the shadow begins to cover or quit any remarkable spot, the difference of those times (if there be any) when compared together

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ther, will give the difference of longitude between the places of observation.

The longitudes of places may also be determined from the observations of solar eclipses; but these, being incumbered with the considerations of parallaxes, are not near so proper as are those of the moon; and each of these happening but rarely, another excellent expedient has been thought of, and that is the eclipses of Jupiter's satellites.

Jupiter has been found to have satellites or moons constantly attending him, always observing the same laws in moving round him.

Now as neither Jupiter nor any of his attendants have any native light of their own, but shine with a borrowed light from the sun, it happens that each of these in every revolution about Jupiter suffers two eclipses, one at their entrance into the shadow, the other at the entrance of their passage behind his body; whence in each revolution of the satellite there are four remarkable appearances, by the observation of any one of which the business may be done, viz. one at the entrance into the shadow, and one at the emersion out of it; one at the entrance behind the body, and another at the coming out; but the latter of these, viz. the ingress and egress of the satellite, into and from under the body, is not so much regarded by astronomers as the immersion into and out of the shadow, because in the former the difficulty of pronouncing the exact time is very great, it requiring, in each observer, eyes equally good and strong, and telescopes equally large; but the observation of the former of these, viz. the immersion into, and emersion out of the shadow, is easy and practicable, because the quick motions of the satellites plunge them so quick into the shadow of Jupiter, that it is no difficult matter to pronounce, by any telescope by which they may be seen, the exact time of their immersion and emersion, as any one may soon be satisfied, if he will but try the experiment.

Now, inasmuch as each of these happens at the same moment of absolute time, if two or more persons, in different places, note the time of observation; these, when compared together, will give the difference of longitude between the two places of observation.

When we consider the great number of these eclipses that happen every year, there being more visible in one year than there are days in it, and consequently but few nights when Jupiter may be seen, and which is near 11 months of the year, but that an eclipse of one or other happens, and sometimes two or three in a night; the easiness with which they may be made, there requiring only a telescope of eight or ten feet in length, which may be almost managed with the hand; and the little likelihood there is of missing the times of ingress or egress, they being in a manner momentaneous: and, lastly, the great exactness to which they would give the difference of longitude, it being certainly as exact as the latitude can at present be taken; it is much to be wondered at, that the more skilful part of our seamen have so long neglected them, and especially in the several ports into which they sail.

Besides these, there is another method equally useful, expeditious and certain, and that is the appulses of the moon to certain fixed stars, and their occultations by the interposition of her body; for, the moon finishing her revolution in the space of 27 days, seven hours, 43 minutes, there are but few clear nights, when the moon does not pass over or so near to some fixed star, that their distance from it, or the time of her visible conjunction with it, may be easily observed by the telescope and micrometer only; and these, when compared together, or with visible time computed to the meridian of some place when a good theory of the moon shall be obtained, will shew the difference of longitude of those places.

The lunar theory is already brought to very great perfection, compared with what it was a few years ago; and there is no room left to doubt, from the great stock of good observations that Mr. Flamstead has left behind, of its being carried on to all the exactness necessary; and then from one single observation of any appulse of the moon to any fixed star, or of an occulation of any emersion of a star from the moon's limb, might the difference of longitude between the place of the observation, and the place to which the said numbers should be fitted, be readily determined.

Mr. Flamstead has given us the places of near 1000 fixed stars, confirmed by several observations that lie within the zodiack, each of which will be covered by the moon and the rest of the planets, in one revolution of their node; so that scarce one night can happen but some or other of them will be eclipsed, or approached so near unto, as to come within the compass of a telescope, in one place of the earth or other; add to these the eclipses of Jupiter's satellites, and it is scarce possible that any clear night can happen, but the heavens afford us some agreeable phænomenon or other, by which the longitude of any place may be duly ascertained.

In the Philosophical Transactions, No. 1, for the month of March, in the year 166⅘, after the invention of pendulum watches by Monsieur Hugens of Zulichem, we have an account of a successful experiment made with two of them by major Holmes, in a voyage from the coast of Guinea homewards, at the request of some of the virtuosos and grand promoters of navigation at that time.

This and some other successes encouraged Monsieur Hugens so far, that after he had improved the structure of these watches, he published an account at large in the Belgick tongue, which was afterwards translated into English, and published in the Philosophical Transactions, No. 47, for the month of May 1669; shewing how and in what manner these watches are to be used in finding the longitude at sea, with directions for adjusting of them and keeping a journal by them; which account the curious reader may see at large in the above-mentioned Transactions, No. 47, in the reading of which, if he is ignorant of these matters, he will meet with some things worthy of his notice.

These discoveries, and the great desire of discovering a method of solving a problem of such importance to navigation, induced the British parliament to offer the following rewards, as an encouragement to any person who should make such a noble discovery:

The author or authors of any such method shall be entitled to the sum of 10,000l. if it determines the longitude to one degree of a great circle; to 15,000l. if it determines the same to two-thirds of that distance; and to 20,000l. if it determines the same to one-half of the same distance; and that half of the reward shall be due and paid when the commissioners of the navy, or the major part of them, agree that any such method extends to the security of ships within 80 geographical miles of the shores, which are places of the greatest danger; and the other half, when a ship, by the appointment of the said commissioners, or the major part of them, shall thereby actually sail over the ocean, from Great Britain to any such port in the W. Indies, as those commissioners, or the major part of them, shall chuse for the experiment, without losing their longitude beyond the limits before-mentioned. The French, Dutch, Spaniards, and other nations, have likewise offered rewards for the same purpose.

Animated by these rewards, a great number of ingenious men applied themselves to solve this useful problem; some by means of time-keepers, and others by improving the lunar theory.

Among the former, the only successful candidate is the ingenious Mr. John Harrison, who, at different times, contrived three different time-pieces for determining the longitude at sea.

The first of Mr. Harrison's machines was tried in May 1736, when it was put on board a man of war, and by its exact measure of time, in its return from Lisbon, corrected an error of almost a degree and an half in the computations of the reckoning of a ship. In 1739, Mr. Harrison finished his second machine, which, from various experiments made upon it, was sufficiently regular and exact, for finding the longitude of a ship within the nearest limits proposed by parliament. Upon the success of this, Mr. Harrison, in 1741, undertook a still more advantageous machine, which he finished in 1758, when he applied to the commissioners of longitude for orders to make a trial of that instrument to some part in the W. Indies, as directed by the statutes for the discovery of the longitude at sea. In consequence of this application, Mr. Harrison received orders for his son to proceed from Portsmouth to Jamaica, in one of his majesty's ships of war, with his third instrument,

ment, in Nov. 1761; and the commiffioners having directed that every requifite ftep and precaution fhould be taken, for making, with care, the proper experiments, and afcertaining their accuracy, not only going to Jamaica, but in the return, it appears, from the calculations made from the experiments in going to Jamaica, that the difference between the longitude, as found by the time-piece, and calculated by the obfervations of the tranfit of Mercury in 1743, at Jamaica and London, is five feconds of time, which at Jamaica is little more than a geographical mile.

During the voyage, Mr. Harrifon's time-piece corrected the fhip's reckoning, which fometimes erred about a degree and a half: and in going from Madeira to Jamaica, it alfo corrected the errors of the log, and fhewed the longitude fo exactly, that the fhip made the ifland of Defeada, and all the other iflands, until they arrived at Jamaica, as foretold by the time-piece. At the arrival at Jamaica, the obfervations for finding the time were made by equal altitudes; and the longitude fhewn by the time-piece being within 5″ of time of the longitude fhewn by the moft accurate obfervations of Mercury, in its tranfit over the fun, in the year 1743, and with which all the obfervations at London and Paris, agreeing within 23″, amounts to a demonftration, that Mr. Harrifon has performed all that is required by the ftatute of the 12th of queen Anne, to entitle him to the greateft reward mentioned in that act. In returning from Jamaica, the weather was very tempeftuous, fo that the time-piece was forced to be placed on the counter, to avoid being perpetually expofed to the fea-water; there it fuffered continual violent agitations, which, though they neceffarily retarded its motion, yet did not occafion any fuch confiderable error as would have made Mr. Harrifon's right to the greateft reward queftionable, had it depended on this voyage only; for the time-keeper, in its going and return, loft only 1′ 54″ and ½, which, in the latitude of Portfmouth, amounts to about 18 geographical miles, or minutes of a great circle, whereas the act required only that it fhould come within the diftance of 30 geographical miles, or minutes of a great circle.

At Mr. Harrifon's return from this voyage, his time-piece was put into the hands of feveral ingenious gentlemen, for their examination; among whom was the learned Mr. Ludlam, who gave the following report:

"The defects in common watches, fays Mr. Ludlam, which Mr. Harrifon propofes to remedy, are the following.

"1. That the main-fpring acts not conftantly with the fame force upon the wheels, and through them upon the balance. 2. That the balance, either urged with an unequal force, or meeting with a different refiftance from the air, or the oil, or the friction, vibrates through a greater or lefs arch. 3. That thefe unequal vibrations are not performed in equal times. 4. That the force of the balance-fpring is altered by a change of heat.

"To remedy the firft defect, Mr. Harrifon has contrived, that his watch fhall be moved by a very tender fpring, which never unrolls itfelf more than one eighth part of a turn, and acts upon the balance through one wheel only. But fuch a fpring cannot keep the watch in motion a long time. He has therefore joined another, whofe office is to wind up the firft fpring eight times in every minute, and which is itfelf wound up but once in a day.

"To remedy the fecond defect, Mr. Harrifon ufes a much ftronger balance-fpring than in a common watch. For if the force of this fpring upon the balance remains the fame, whilft the force of the other varies, the errors arifing from that variation will be the lefs as the fixed force is the greater. But a ftronger fpring will require either a heavier or a larger balance. A heavier balance would have a greater friction. Mr. Harrifon therefore increafes the diameter of it. In a common watch it is under an inch, in this of Mr. Harrifon's two inches and two tenths.

"Had thefe remedies been perfect, it would have been unneceffary to confider the defects of the third fort. But the methods already defcribed only leffening the errors, not removing them, Mr. Harrifon ufes two ways to make the times of the vibrations equal, though the arches may be unequal. One is to place a pin, fo that the balance-fpring, preffing againft it, has its force increafed; but increafed lefs when the vibrations are larger; the other to give the palates fuch a fhape, that the wheels prefs them with lefs advantage, when the vibrations are larger.

"To remedy the laft defect, Mr. Harrifon ufes a bar compounded of two thin plates of brafs and fteel, about two inches in length, rivetted in feveral places together, faftened at one end, and having two pins at the other, between which the balance-fpring paffes. If this bar be ftraight in temperate weather, brafs changing its length by heat more than fteel, the brafs fide becomes convex when it is heated; and the fteel fide, when it is cold: and thus the pins lay hold of a different part of the fpring in different degrees of heat, and lengthen or fhorten it, as the regulator does in a common watch.

"The two firft of thefe improvements, any good workman, who fhould be permitted to view and take to pieces Mr. Harrifon's watch, and be acquainted with the tools he ufes, and the directions he has given, could, without doubt, exactly imitate. He could alfo make the palates of the fhape propofed; but for the other improvements, Mr. Harrifon has given no rules. He fays, that he adjufted thofe parts by repeated trials, and that he knows no other method. This feems to require patience and perfeverance; but with thefe qualifications other workmen need not defpair of fuccefs equal to Mr. Harrifon's. There is no reafon to fufpect that Mr. Harrifon has concealed from us any part of his art.

"If our opinion of the excellence and ufefulnefs of this machine be afked, I muft fairly own, that nothing but experience can determine the ufe of it with certainty; however, I think it my duty, fays the above gentleman, to declare to the board the beft judgment I can form.

"The firft of Mr. Harrifon's alterations is, I believe, an improvement, but not very confiderable. Probably, if the other defects in common watches could be removed, the changes in the force of the main-fpring would not occafion fuch errors as would make them ufelefs at fea.

"The next alteration feems to be of greater importance; I fuppofe it contributes more to the exactnefs of the watch than all the other changes put together, but is attended with fome inconvenience. The watch is liable to be difordered, and even ftopped by almoft any fudden motion, and, when ftopped, does not move again of itfelf. But as it has gone two voyages without any fuch accident, it may feem that this danger at fea is not confiderable.

"The principle on which Mr. Harrifon forms the alterations of the third fort is, that the longer vibrations of a balance moved by the fame fpring, are performed in lefs time. This is contrary to the received opinion among the philofophers and workmen. But if Mr. Harrifon is right, yet whether the method he has propofed will correct the errors, or not, is to me quite uncertain.

"The laft alteration before-mentioned is ingenious and ufeful; but that it can be made to anfwer exactly to the different degrees of heat, feems not probable."

Longitude *of Motion*, according to fome philofophers, is the diftance which the centre of any moving body runs through, as it moves on in a right line. See Motion.

LONGITUDINAL, in general, denotes fomething placed lengthwife: thus fome of the fibres of the veffels in the human body are placed longitudinally, others tranfverfely, or acrofs

LONICERA, in botany, a genus of the pentandria monogynia clafs. The corolla confifts of one irregular petal; and the berry of two cells containing many feeds. There are 13 fpecies, only one of which, viz. the periclymenum, or common honey-fuckle, is a native of Britain.

LOOF, in fhip-building, that part of a fhip where the bow begins, or where the planks of her fore part begin to bend, and round inward as fhe grows narrower approaching the ftem.

LOOKING-Glasses are nothing but plain mirrors of glafs; which being impervious to the light, reflect the images of things placed before them; for the theory of which fee Mirror and Reflection.

LOOM, a frame compofed of a variety of parts, ufed in all the branches of weaving. See Weaving.

LOOP-Holes, in a ſhip, are holes made in the coamings of the hatches, to fire muſkets through in a cloſe fight.

LOPPING, among gardeners, the cutting off the ſide-branches. It is obſervable, ſays Mr. Millar, that moſt old trees, as aſh, elm, hornbeam, &c. are hollow within, which does not proceed from the nature of the trees, but in their being ſuffered to grow large before they are lopped. The lopping of young trees of ten or twelve years old, at moſt, will preſerve them much longer, and will occaſion the ſhoots to grow more into wood in one year than they do in old tops at two or three. Great boughs ill taken off, are very prejudicial to trees; for which reaſon they ſhould always be taken off cloſe and ſmooth, and not parallel to the horizon; and the wound ſhould be covered with a mixture of loam and horſe-dung, to prevent the wet from entering the body of the tree: however, no trees ſhould be lopped but pollard-trees, for nothing is more injurious to the growth of timber trees than lopping off great branches from them. All ſorts of reſinous trees, or ſuch as abound with a milky juice, ſhould be lopped ſparingly; for they are ſubject to decay when often cut. The beſt ſeaſon for lopping trees is ſoon after Bartholomew-tide; at which time they ſeldom bleed much, and the wound is commonly healed over before the cold weather comes on.

LORD, a title of honour variouſly applied among us. It ſometimes denotes ſuch as are noble either by birth or creation, otherwiſe called peers of the realm, or lords of parliament; ſometimes all the ſons of dukes and marquiſſes and the eldeſt ſon of an earl; ſometimes it is annexed to an office, as lord chief juſtice, lord privy-ſeal, lord of the treaſury, &c. and ſometimes to an inferior perſon poſſeſſed of a fee, having the homage of tenants within his manor, and is commonly called landlord. Of this laſt ſort there is lord meſne and lord paramount: the former is owner of a manor, having tenants who hold of him and by copy of court-roll, and yet he himſelf holds of another ſuperior lord, called lord paramount.

Lord *Lieutenant of a County*, is an officer of great diſtinction, appointed by the king for managing the ſtanding militia, and other military affairs of the county.

LOTION, *Lotio*, waſhing, in phyſick, a ſort of medicine compounded of liquid ingredients, for beautifying the face, and cleanſing it from any deformity which the blood throws out. It alſo denotes a medicine that holds a medium between a fomentation and a bath.

Lotion, in pharmacy, a preparation of medicines by waſhing them in liquid, either to clear them of the dregs, or of ſome ſalt or corroſive ſpirit, or to communicate ſome virtue to them.

LOTTERY, a kind of game at hazard, common in England, Holland, and France, in order to raiſe money, which is appointed by publick authority of parliament with us, and conducted by commiſſioners nominated for that purpoſe. It conſiſts of a certain number of blanks and prizes, which are drawn out of a kind of wheel, of which there are two contrived; the one containing the numbers, and the other the correſponding blanks or prizes.

LOUIS d'or, a French coin, firſt ſtruck under the reign of Louis XIII. in 1640. They have at different times riſen from ten livres to 40 and upwards, only that in the laſt coinings the weight was augmented in ſome proportion to the price, which in the former reign was never regarded. On one ſide is the king's head and name, and on the other a croſs, conſiſting of eight L's cantoned with crowns, with this legend, "Chriſtus regnat, vincit, imperat." The ordonnance makes it 23 carats and one-fourth value, and allows an abatement of the eighth part of a carat.

There are alſo white Louis's or Louis's d'argent, of 60 and 30 ſols, which we call crowns and half crowns, as alſo of 15, five and four ſols; on each ſide of which is the king's head, and on the other the arms of France, with this legend, "Sit nomen Domini benedictum." In this coin there are allowed two grains abatement in the weight, and ſometimes eight grains.

Knights of St. Louis, a military order, inſtituted by Louis XIV. in April 1693, in favour of his land and ſea officers. The king is ſovereign. None can be admitted into this order but ſuch as have honourably ſerved 10 years. It conſiſts of eight great croſſes and 24 commanders. The number of knights abſolutely depends on the king's pleaſure. They alſo wear a gold croſs, enamelled with white, and crowned with flowers de lis. On one ſide is St. Louis, with this inſcription, Lud. M. inſtit. 1693: on the reverſe is a naked ſword, holding on its point a crown of laurel, with this inſcription, "Bell. virtutis præm." The order was at firſt endowed with a fund of 300,000 livres charged on the king's revenues. The great croſſes have a penſion of 8000 livres; commanders, 4000; and the reſt, 3000.

LOXODROMY, *Loxodromia*, in navigation, the line which a ſhip deſcribes in ſailing on the ſame collateral rhumb. The loxodromy or loxodromick line cuts all the meridians in the ſame angle, called the loxodromick angle. See Course.

LOZENGE, *Lozange*, *Rhombus*, in geometry, a quadrilateral figure, conſiſting of four equal and parallel ſides, two of whoſe oppoſite angles are acute, and the other obtuſe; the diſtance between the two obtuſe ones being always equal to the length of one ſide. When the ſides are unequal, it is called rhomboides.

Lozenge, in heraldry; in this figure all unmarried gentlemen and widows bear their coats of arms. It differs from the fuſil, in that the latter is narrower, and not ſo ſharp at the ends.

LUCERNE, in botany, &c. a plant frequently cultivated in the manner of clover, and known among authors by the names of medica and medicago.

The ſoil in which this plant is found to ſucceed beſt in this country, is a light, dry, looſe, ſandy land, which ſhould be well ploughed and dreſſed, and the roots of all noxious weeds, ſuch as couch graſs, &c. deſtroyed; otherwiſe theſe will overgrow the plants while young, and prevent their progreſs.

The beſt time to ſow the ſeed is about the middle of April, when the weather is ſettled and fair: for if you ſow it when the ground is very wet, or in a rainy ſeaſon, the ſeeds will burſt and come to nothing, as is often the caſe with ſeveral of the leguminous plants; therefore you ſhould always obſerve to ſow it in a dry ſeaſon; and if there happens ſome rain in about a week or ten days after it is ſown, the plants will ſoon appear above ground.

After having well ploughed and harrowed the land very fine, you ſhould make a drill quite acroſs the ground, almoſt half an inch deep, into which the ſeeds ſhould be ſcattered very thin: then cover them over a quarter of an inch thick, or ſomewhat more, with the earth: then proceed to make another drill, about a foot and a half from the former, ſowing the ſeeds therein in the ſame manner as before, and ſo proceed through the whole ſpot of ground, allowing the ſame diſtance between row and row and ſcatter the ſeeds very thin in the drills. In this manner, an acre of land will require about ſix pounds of ſeed: for when it is ſown thicker, if the ſeeds grow well, the plants will be ſo cloſe as to ſpoil each other in a year or two, the heads of them growing to a conſiderable ſize, as will alſo the roots, provided they have room; for the crown of ſome will meaſure eighteen inches diameter; from which near four hundred ſhoots have been cut at one time, which is an extraordinary increaſe, and this upon a poor dry gravelly ſoil, which had not been dunged for many years, but the roots were at leaſt ten years old; ſo that if this crop be well cultivated, it will continue many years, and be equally good as when it was firſt ſown: for the roots generally run down very deep in the ground, provided the ſoil be dry; and although they ſhould meet a hard gravel a foot below the ſurface, yet their roots would penetrate it and make their way downward, ſome of them having been taken up, which were above a yard in length, and had run two feet into a rock of gravel, ſo hard as not to be looſened without mattocks, and crows of iron, and that with much difficulty.

The reaſon for directing this ſeed to be ſown in rows is, that the plants may have room to grow; and for the better ſtirring the ground between them, to deſtroy the weeds, and encourage the growth of the plants, which may be very eaſily effected with a Dutch hoe, juſt after the cutting the crop each time, which will cauſe the

 plants

plants to ſhoot again in a very little time, and be much ſtronger than in ſuch places where the ground cannot be ſtirred: but when the plants firſt come up, the ground between ſhould be hoed with a common hoe; and if in doing of this you cut up the plants where they are too thick, it will cauſe the remaining to be much ſtronger. This hoeing ſhould be repeated two or three times while the plants are young, according as the weeds are produced, obſerving always to do it in dry weather, that the weeds may the better be deſtroyed; for if it be done in moiſt weather, they will root and grow again.

With this management, the plants will grow to the height of two feet, or more, by the beginning of Auguſt, when the flowers will begin to appear, at which time the lucerne ſhould be cut, obſerving to do it in a dry ſeaſon, if it is to be made into hay, and keep it often turned, that it may ſoon dry, and be carried off the ground; for if it lie long upon the roots, it will prevent their ſhooting again. After the crop is taken off, you ſhould ſtir the ground between the rows with a hoe, to kill the weeds, and looſen the ſurface, which will cauſe the plants to ſhoot out again in a ſhort time, ſo that by the beginning of September there will be ſhoots four or five inches high, when you may turn in ſheep upon it to feed it down: nor ſhould the ſhoots be ſuffered to remain upon the plants, which would decay when the froſty weather comes on, and fall down upon the crown of the roots, and prevent their ſhooting early the ſucceeding ſpring.

The beſt way therefore is to feed it until November, when it will have done ſhooting for that ſeaſon: but it ſhould not be fed by large cattle the firſt year, becauſe the roots being young, would be in danger of being deſtroyed, either by their trampling upon them, or their pulling them out of the ground: but ſheep will be of ſervice to the roots by dunging the ground, provided they do not eat it too cloſe, ſo as to endanger the crown of the root.

In the beginning of February, the ground between the rows ſhould be again ſtirred with the hoe, to encourage them to ſhoot again: but in doing this you ſhould be careful not to injure the crown of the roots, upon which the buds are at that time very turgid, and ready to puſh. With this management, if the ſoil be warm, by the middle of March the ſhoots will be five or ſix inches high, when, if you are in want of fodder, you may feed it down till a week in April; after which it ſhould be ſuffered to grow for a crop, which will be fit to cut the beginning of June, when you ſhould obſerve to get it off the ground as ſoon as poſſible, and ſtir the ground again with the Dutch hoe, which will forward the plants ſhooting again; ſo that by the middle or latter end of July, there will be another crop fit to cut, which muſt be managed as before; after which it ſhould be fed down again in autumn; and as the roots by this time will have taken deep hold in the ground, there will be little danger of hurting them, if you ſhould turn in larger cattle; but you muſt always obſerve not to ſuffer them to ramain after the roots have done ſhooting, leſt they ſhould eat down the crown of the roots below the buds, which would conſiderably damage, if not deſtroy them.

In this manner you may continue conſtantly to have two crops to cut, and two feedings, upon this plant; and in good ſeaſons there may be three crops cut, and two feedings, which will be a great improvement, eſpecially as this plant will grow upon dry barren ſoils, where graſs will come to little, and be of great uſe in dry ſummers, when graſs is often burnt up: and as it is an early plant in the ſpring, ſo it will be of great ſervice when fodder falls ſhort at that ſeaſon, when it will be fit to feed at leaſt a month before graſs or clover; for this plant is often eight inches high by the middle of March, at which time the graſs in the ſame place is ſcarcely one inch high.

Cold will not injure this plant: for in the very cold winter, 1728-9, ſome roots of this plant which were dug up in October, and laid upon the ground in the open air till the beginning of March, were again planted, and they ſhot out very vigorouſly ſoon after: nay, even while they lay upon the ground, they ſtruck out fibres from the under ſide of the roots, and had begun to ſhoot green from the crown of the roots: but wet will altogether deſtroy the roots; for a little of the ſeed being ſown upon a moiſt ſpot of ground for a trial, it came up very well, and flouriſhed exceedingly during the ſummer ſeaſon; but in winter, when the great rains fell, the roots began to rot at bottom; and before the ſpring moſt of them were deſtroyed.

The beſt places to procure the ſeeds from, are Switzerland and the northern parts of France, which ſucceeds better with us than that which comes from a more ſouthern climate: but this ſeed may be ſaved in England in great plenty; in order to which, a ſmall quantity of the plants ſhould be ſuffered to grow uncut till the ſeeds are ripe, when it muſt be cut, and laid to dry in an open barn, where the air may freely paſs through: but the ſeed muſt be defended from the wet; for if it be expoſed thereto, it will ſhoot while it remains in the pod, whereby it will be ſpoiled. When it is quite dry, it muſt be threſhed out, and cleanſed from the huſk, and preſerved in a dry place till the ſeaſon for ſowing it: and this ſeed ſaved in England is much preferable to any brought from abroad; the plants produced from it being much ſtronger than thoſe produced from the French, Helvetian, and Turky ſeeds, which are ſown at the ſame time, and on the ſame ſoil and ſituation.

LUCID Intervals, in lunaticks, the times wherein they appear to be in their ſenſes.

LUCIDA, in aſtronomy, an appellation given to ſeveral fixed ſtars, on account of their ſuperior brightneſs; as the lucida coronæ, a ſtar of the ſecond magnitude, in the northern crown; the lucida hydræ, or cor hydræ; and the lucida lyræ, a ſtar of the firſt magnitude in that conſtellation.

LUES, among phyſicians, is, in general, uſed for a diſeaſe of any kind; but, in a more particular ſenſe, is reſtrained to contagious and peſtilential diſeaſes: thus the lues Gallica, or venerea, ſignifies the venereal diſeaſe.

LUFF, among ſailors, the order from the pilot to guide the ſhip's head nearer to the direction of the wind, or nearer to that part of the horizon from which the wind bloweth.

She keeps a good Luff, i. e. holds her way well, without deviating to the leeward of her courſe. See Leeward.

Luff-Tackle, a complication of pullies, conſiſting of two blocks, which may be either both of them double, or one of them ſingle. The rope which forms the tackle, and is called the fall, is paſſed alternately through the blocks, and then has its end faſtened to one of them, till it becomes four or five fold: the mechanical power of a luff-tackle is very great, inſomuch that three or four men will draw as much weight with this as ſeven or eight would with a ſingle rope faſtened to the ſame body. See Tackle.

LUKE, or *Goſpel of St.* Luke, a canonical book of the New Teſtament. Some think it was properly St. Paul's Goſpel, and that when that apoſtle ſpeaks of his Goſpel, he means what is called St. Luke's. Irenæus ſays, that St. Luke digeſted into writing what St. Paul preached to the Gentiles; and Gregory Nazienzen tells us, that St. Luke wrote with the aſſiſtance of St. Paul.

St. Luke *the Evangeliſt's Day*, a feſtival in the Chriſtian church, obſerved on the 18th of October.

LUMBAGO, in phyſick, a violent pain in the loins, which affects the patient in ſuch a manner that he can ſcarcely move. It is a ſcorbutick ſymptom, and frequently excited by the gout or rheumatiſm.

LUMBARIS, a name given to the arteries and veins which ſpread over the loins; or an epithet to diſtinguiſh thoſe branches of the aorta which carry the blood to the muſcles of the loins, to thoſe of the abdomen and other of the circumjacent parts, and alſo to certain veins which bring back the blood from the loins into the trunk of the vena cava.

LUMBRICAL, a name given to four muſcles of the fingers, and to as many of the toes. They are in each called the flexors of the firſt phalanx: thoſe of the fingers ariſe deep and tendinous, and are inſerted into the firſt phalanges on the ſide next the thumb: thoſe of the toes have their origin from the tendon of the muſculus perforans, and from the interior part of the calcaneum: their termination is at the firſt phalanx of the ſeveral toes.

LUNA, in aſtronomy, the moon. See Moon.

Luna, among chymiſts, ſignifies ſilver. See Silver.

LUNAR, ſomething belonging to the moon; thus we ſay lunar month, lunar year, lunar dial, lunar eclipſe, &c. See Moon, Month, Year, &c.

LUNARIA, moon-wort, in botany, a genus of plants whose flower is tetrapetalous and cruciform: it hath six stamina, two of which are shorter than the rest; the fruit is a large, erect, plane, compressed, elliptical pod, opening with two valves, and containing two cells, which inclose a few compressed kidney-shaped seeds.

LUNATICK, a person affected with lunacy, the cure of which is to be attempted by evacuations of all kinds, as bleeding, vomiting, cathartick, &c. See MADNESS.

LUNGS, a part of the human body, which is the cause or instrument of respiration. The lungs are the large viscus of the thorax: they are situated in the two sides of it, with the heart as it were between them; and are connected, by means of the mediastinum, with the sternum and vertebræ; with the heart by means of the pulmonary vessels, and immediately with the aspera arteria. The colour of the lungs, in infants, is a fine florid red; in adults it is darker; and in old people, livid, or variegated with black and white. When inflated, they have some resemblance to the hoof of an ox; and are convex on the upper side, and concave underneath. They are divided into two large lobes, the right and left; the left, which is the smaller, is divided again into three smaller ones. The membrane with which the lungs are surrounded, is continuous with the pleura.

The vessels which compose part of the substance of the lungs are of three or four kinds; the air vessels, blood vessels, and lymphaticks, to which we may add the nerves. The air vessels make the principal part, and are termed bronchia.

These bronchia are conical tubes, composed of an infinite number of cartilaginous fragments, like so many irregular arches of circles, connected together by a ligamentary elastick membrane; and disposed in such a manner, as that the lower easily insinuate themselves within those above them. They are lined on the inside by a very fine membrane, which continually discharges a mucilaginous fluid; and in the substance of the membrane are a great number of small blood vessels, and on its convex side, many longitudinal lines, which appear to be partly fleshy, and partly made up of an elastick substance of another kind.

The bronchia are divided, in all directions, into an infinite number of ramifications, which diminish gradually in size; and as they become capillary, change their cartilaginous structure into that of a membrane. Besides these very small extremities of this numerous series of ramifications, we find that all the subordinate trunks, from the greatest to the smallest, send out, from all sides, a vast number of short capillary tubes, of the same kind.

Each of these numerous bronchial tubes is widened at the extremity, and thereby formed into a small membraneous cell commonly called a vesicle. These cells, or folliculi, are closely connected together in bundles; each small branch producing a bundle proportionable to its extent, and the number of its ramifications.

These small vesicular or cellular bundles are termed lobules; and as the great branches are divided into small ramifications, so the great lobules are divided into several small ones. The cells or vesicles of each lobule have a free communication with each other, but the several lobules do not communicate so readily.

The lobules appear distinctly to be parted by another cellular substance, which surrounds each of them, in proportion to their extent, and fills up the interstices between them. This substance forms likewise a kind of irregular, membranous cells, which are thinner, looser, and broader, than the bronchial vesicles.

This substance is dispersed through every part of the lungs, and forms cellular and spongy vaginæ, which surround the ramifications of the bronchia and blood vessels; and is afterwards spread over the outer surface of each lung, where it forms a kind of fine cellular coat, joined to the general coat of that viscus.

When we blow into this interlobular substance, the air compresses and flattens the lobuli; and when we blow into the bronchial vessels, they presently swell; and if we contrive to blow with force, the air passes insensibly into the interlobular substance. We owe this observation to M. Helvetius. All the bronchial cells are surrounded by a very fine reticular texture of the small extremities of arteries and veins, which communicate every way with each other. The greatest part of this admirable structure is the discovery of the illustrious Malpighi.

The blood vessels of the lungs are of two kinds, one commonly called the pulmonary arteries and veins; the other properly called the bronchial arteries and veins.

The pulmonary artery goes out from the right ventricle of the heart; and its trunk, having run almost directly upward, as high as the curvature of the aorta, is divided into two lateral branches; one going to the right hand called the right pulmonary artery, the other to the left termed the left pulmonary artery. The right artery passes under the curvature of the aorta, and is consequently longer than the left: they both run to the lungs, and are dispersed through their whole substance by ramifications nearly like those of the bronchia, and lying in the same directions.

The pulmonary veins, having been distributed through the lungs, in the same manner go out on each side, by two great branches, which open laterally into the reservoir, or muscular bag, of the right auricle.

The ramifications of these two kinds of vessels in the lungs are surrounded every where by the cellular substance already mentioned, which likewise gives them a kind of vagina; and the rete mirabile of Malpighi described above is formed by the capsular extremities of these vessels. It must be observed that the ramifications of the arteries are more numerous and larger than those of the veins, which in all other parts of the body exceed the arteries, both in number and size.

Besides these capital blood vessels, there are two others called the bronchial artery and vein; the artery has become very famous of late, by the description given of it by Mr. Ruysch. The vein was doubted of for some time, but it exists as really as the artery, and may be easily demonstrated.

These two vessels are very small, appearing only like very fine arteries and veins coming from the aorta. vena cava, and their branches; and they seem to have no other use but that of nourishing the lungs.

The varieties in the origins of the bronchial arteries and veins, especially of the arteries; their communications or anastomoses with each other, and with the neighbouring vessels; and above all. the immediate anastomoses of the bronchial artery with the common pulmonary vein; are of great consequence in the practice of physick.

The bronchial arteries come sometimes from the anterior part of the aorta descendens superior, sometimes from the first intercostal artery, and sometimes from one of the œsophagæ. They go out sometimes, separately, towards each lung; sometimes by a small common trunk, which afterwards divides to the right and left, near the bifurcation of the aspera arteria and following ramifications of the bronchia. The left bronchial artery comes often from the aorta, and the right from the superior intercostal, on the same side, because of the situation of the aorta. There is likewise another which arises from the aorta posteriorly, near the superior intercostal, and above the anterior bronchialis.

The bronchial artery gives off a small branch to the auricle of the heart, on the same side, which communicates immediately with the coronary artery.

Sometimes one bronchial artery gives origin to several superior intercostals, and sometimes several bronchial arteries send off separately the same number of intercostals. The bronchial veins, as well as arteries, were known to Galen; these veins are sometimes branches of the azygos, coming from the upper part of the curvature or arch. The left vein is sometimes a branch of the common trunk of the intercostals of the same side; and sometimes both veins are branches of the gutturalis.

The lungs have a great many nerves distributed through them by filaments which accompany the ramifications of the bronchia and blood vessels, and are spread on the cells, coats, and all the membranous parts of the lungs. The nervi sympathetici medii & majores, commonly called nerves of the eighth pair, or the intercostals, form, behind each lung, a particular intermixture, called plexus pulmonaris, from whence nervous filaments go out, which communicate with the plexus cardiacus and stomachicus.

On the surface of the human lungs, between the external

ternal and cellular coat, we obferve fomething that looks like lymphatick veffels; but we ought to take care not to miftake, for fuch veffels, a tranfparent reticular fubftance obfervable on the furface of the lungs, after blowing ftrongly into the lobuli, this appearance being entirely owing to the air which paffes through the bronchial veffels into the interlobular cells, and which, by feparating a certain number of lobuli, finds room to lodge between them. The true lymphatick veffels of the lungs are moft vifible in brutes; and in an horfe particularly, one of thefe veffels has been obferved to run along a great part of one edge of the lungs.

Under the root of each lung, that is, under that part formed by the fubordinate trunk of the pulmonary artery, by the trunks of the pulmonary veins, and by the trunk of the bronchia, there is a pretty broad membranous ligament, which ties the pofterior edge of each lung to the lateral parts of the vertebræ of the back, from that root all the way to the diaphragm.

Refpiration is performed by organs of two kinds, one of which may be looked upon as active, the other as paffive; the lungs are of the fecond kind; and the firft comprehends, principally, the diaphragm and intercoftal mufcles.

As foon as the intercoftal mufcles begin to contract, the arches of the ribs are raifed, together with the fternum, and placed at a greater diftance from each other; by which means the cavity of the thorax is enlarged on the two lateral and anterior fides.

At the fame inftant the diaphragm is flatted, or brought toward a plane by two motions, which are apparently contrary; that is, by the contraction of the diaphragm and the dilatation of the ribs, in which it is inferted. The external furface of the thorax being thus, in a manner, increafed, and the cavity of the bronchial being, at the fame time, and by the fame means, lefs refifted, or preffed upon, the ambient air yields to the external preffure, and infinuates itfelf into all the places where the preffure is diminifhed; that is, into the afpera arteria, and into all the ramifications of the bronchia, all the way to the veficles. This is what is called infpiration.

This motion of infpiration is inftantaneous, and ceafes in a moment, by the relaxation of the intercoftal mufcles; the elaftick ligaments and cartilages of the ribs bringing them back, at the fame time, to their former fituation. This motion by which the ribs are depreffed, and brought nearer each other, is termed exfpiration.

The pulmonary arteries and veins which accompany the bronchia through all their ramifications, and furround the veficles, tranfmit the blood through their narrow capillary extremities, and thereby change or modify it, at leaft in three different manners.

The firft change or modification which the blood undergoes in the lungs, is to have the cohefion of its parts broken, to be attenuated, pounded, and, as it were, reduced to powder. The fecond is to be deprived of a certain quantity of ferum, which tranfpires through the lungs, and is what we commonly call the breath. The third is to be in a manner reanimated, by the impreffion of the air, whether the whole body of the air enters the blood, whether the common air is only the vehicle of fome finer parts which are conveyed to it, or whether the air only compreffes, or fhakes the blood, as it paffes round the bronchial veffels in the reticular capillary extremities of the veffels.

The cartilages of the afpera arteria, and bronchia, ferve, in general, to compofe a canal, the fides of which will not fink in, or fubfide by compreffion, but will neverthelefs yield to certain preffures and impulfes without breaking. As thefe cartilages are not complete circles, or rings, and as their circumferences are completed by elaftick membranes, they allow of thefe dilatations and contractions, which modulate the voice; and as they are connected by elaftick ligaments of a confiderable breadth, the alternate elongation and contraction of the bronchia are facilitated in the motions of refpiration.

LUNISOLAR, in aftronomy and chronology, fomething compofed of the revolution of the fun and moon.

Lunisolar *Year*, a period of years produced by multiplying the cycle of the moon, 19 by 28, that of the fun; the product is 532; in which fpace of time thefe luminaries return to the fame point in the heavens.

LUPERCI, the priefts of Pan, of which there were two colleges, the Fabii and Quintilii; to thefe was added a third called Julii, in honour of Julius Cæfar.

LUPUS, wolf, in aftronomy, a conftellation of the fouthern hemifphere.

LURE, in falconry, a piece of leather made in the form of a bird, and fometimes baited with a bit of flefh, to call back a hawk.

LUSTRE, the glofs appearing on ftuffs, filks, &c. and it likewife denotes the compofition or manner of giving that glofs. Silks are gloffed by wafhing in foap, then clear water, and dipping them in cold allum-water; clothes and ftuffs by preffing. The luftre of black taffaty is given by twice brewed beer boiled with orange or lemon-juice; that of coloured taffaties with water of gourds diftilled in an alembick.

Curriers glofs their black leather firft with barberry-juice, then with gum-arabick, ale, vinegar, and Flanders glue boiled together: for coloured leather they ufe the white of an egg beat in water.

Hats have a luftre given them with common water, fometimes a little black dye is added. The fame luftre ferves for furs: for very black furs there is fometimes prepared a luftre of galls, copperas, Roman allum, ox's marrow, &c.

LUSTRAL, in antiquity, is applied to the water ufed in their ceremonies, to fprinkle and purify the people.

Lustral *Day*, in antiquity, that whereon the luftrations were performed for a child, and its name given.

LUSTRATION, *Expiation*, in antiquity, facrifices or ceremonies by which the Romans purified their cities, fields, armies, or people defiled by any crime.

Some luftrations were publick, others private. There were three manners of performing luftrations, by fire and fulphur, by water and by air; befides the luftration for children.

LUSTRUM, among the Romans, denoted the fpace of five years; as alfo a ceremony or facrifice ufed by them after numbering their people every fifth year.

LUTE, *Lutum*, in chymiftry, a mixed, tenacious, ductile fubftance, which grows folid with drying, and applied to the junctures of veffels for diftillation, ftops them up. When the object is merely aqueous, linfeed meal, ground fine, and well worked up into a ftiff pafte with the white of an egg, makes a proper luting; it grows hard with heat, and if it happen to crack, it is repaired by a frefh application. In the diftillation of all fermented inflammable fpirits and volatile alkaline falts, a pafte made of the meal, well worked up with cold water, anfwers very well. In the diftillation of mild acids or acetous liquors, a bladder fteeped in water, till it grow flimy, makes an excellent luting. A luting that acquires a ftony hardnefs is neceffary in the diftillation of foffil acids, as vitriol, fea-falt, &c. which is called the philofophical luting, and may be prepared from the calx of copperas and quick-lime, by boiling the caput mortuum in vitriol, in feveral parcels of water, till thoroughly wafhed, then drying the powder, and preferving it in a clofe veffel. This powder is to be rubbed with an equal quantity of quick-lime, and wrought into a pafte with the whites of eggs; firft beat them; and this luting immediately applied, the veffel being firft a little heated. Or beat pure fand and potters clay together in fuch proportion with water, till the matter no longer fticks to the fingers: then add a fourth part of common lime; and the drier this is applied the better, provided it be left ductile, and the cracks are eafily ftopped up by the fame.

To coat veffels in the ftronger diftillations with a naked fire, beat fat potters earth and powdered fand with water into a well-wrought pafte, which will not ftick to the fingers, adding a little common lime at the laft, and beating them together: then, the veffel being expofed to the vapour of hot water, fpread the cement all over it equably with the hand, afterwards fprinkle the furface of the coating with hot and dry fand, and let the coat dry flowly in a cool place, minding to fill up the cracks.

The London chymifts ufe for the fame purpofe fifted wood-afhes beat up to a due confiftence with the white of eggs and a little gum-water. The fame fervice may be performed in a more excellent manner by a mixture of linfeed oil and cerufs made by infolation or decoction, and afterwards ground upon a marble with frefh cerufs, till the whole be of the confiftence of an unguent.

LUTE, a musical instrument of the string kind.

The lute consists of the table; the body or belly, which has nine or ten sides; the neck, which has nine or ten stops marked with strings; and the head or cross, wherein are screws for raising or lowering the strings. In the middle of the table is a rose for the passage of the sound. There is also a bridge to which the strings are fastened, and a piece of ivory between the head and the neck, to which the other extremities of the strings are fitted. The strings are struck with the right hand, and with the left the stops are pressed.

LUTHERANISM, the sentiments of Dr. Martin Luther and his followers, with regard to religion.

Lutheranism had its rise in the 16th century: its author was born at Eisleben in Thuringia, in 1483.—After his studies, he entered himself among the Augustines; and in 1512, took the cap of a doctor in theology, in the university of Witenberg.

In 1516, he attacked the school-divinity in several theses.—In 1517, Leo X. having ordered indulgences to be dispensed to those who should contribute towards the building of S. Peter's church at Rome, he gave a commission thereof to the Dominicans.—The Augustines thinking they had a title to it before any body else, John Staupitz, their commissary-general, appointed Luther to preach against those dispensers of indulgences.

Luther acquitted himself, in a manner, that perhaps the commissary had not imagined: from the preachers of indulgences, he proceeded to indulgences themselves, and inveighed very warmly, both against the one and the other.

At first he only advanced ambiguous propositions; but being engaged in dispute about them, he maintained them openly, and without reserve; insomuch, that in 1520 he was solemnly condemned, and excommunicated by the pope.—But neither the pope's thunder, nor the condemnation of several universities, could make any impression of terror upon him; but he continued preaching, writing and disputing, not against indulgences only, but several other corruptions which then prevailed in the church.

The character of the man, the strength of his arguments, but above all the goodness of his cause, soon procured him a number of followers.—And thus it was that *Lutheranism* was formed; the adherents whereto were called *Lutherans*, from *Lutherus*, a name which has a Greek turn, and which he assumed in lieu of his family name, *Lotter*, or *Lauther*; it being the custom of those days, for men of learning to give themselves Greek names: witness Erasmus, Melancthon, Bucer, &c.

Luther, in 1523, quitted the habit of a religious, and in 1524, married; he reduced the number of sacraments to two, viz. baptism and the eucharist; but he believed the impanation or consubstantiation, that is, that the matter of bread and wine remains with the body and blood of Christ; and herein is the main difference betwixt the Lutheran and English church. Luther maintained the mass to be no sacrifice; exploded the adoration of the host, auricular confession, meritorious works, indulgences, purgatory, the worship of images, &c. which had been introduced into the Romish church. He also opposed the doctrine of free will; maintained predestination, effectual calling, God's everlasting love, and the final perseverance of the saints; that we are only justified by the imputation of the merits and satisfaction of Christ. He also opposed the fastings in the Romish church, monastical vows, the celibacy of the clergy, &c.

Melancthon says, "Pomeranus is a grammarian; I "am a logician; and Justus Jonas is an orator; but "Luther is good at every thing; the wonder of man- "kind; for whatever he says, or writes, it penetrates "the heart, and makes a lasting impression."

It has also been said of Luther, that it was a great miracle a poor friar should be able to stand against the pope; it was greater that he should prevail; and the greatest of all, that he should die in peace, as well as Erasmus, when surrounded by so many enemies.

Luther used to say, That three things made a divine; meditation, prayer, and temptation. And that three things were to be done by a minister; to read the bible diligently, to pray earnestly, and always to be a learner.

The doctrine of this eminent divine, and great reformer, extended itself through all Germany, Denmark, Sweden, England, and other countries, under some different modification. "We will conclude his character," says a learned divine, "with these verses, which belong "to him much better than to Pollux, Hercules, Augus- "tus, and others to whom Horace applied them."

Justum & tenacem propositi virum
Non civium ardor prava jubentium,
  Non vultus instantis tyranni
    Mente quatit solida, neque Auster
Dux inquieti turbidus Hadriæ,
Nec fulminantis magna Jovis manus:
  Si fractus illabatur orbis,
    Impavidum ferient ruinæ.

LUTHERANS, a sect of protestants who profess Lutheranism.

LUTHERN, in architecture, a kind of window over the cornice, in the roof of a building, standing perpendicularly over the naked of the wall, and serving to illuminate the upper story.

LUXATION, *Luxatio*, in surgery, the recess or removal of the moveable extremity of a bone from the hollow or socket in which it is naturally moved, accompanied with a hindrance of motion. This removal is either total or partial; the former is a luxation, and the latter a distortion.

The method of healing luxations is very near the same with that of fractures. Two things are necessary; first, a reduction of the luxated parts; and, secondly, a retention of them in their natural situation. We are also, during the course of the cure, by proper remedies and a due regimen, to mitigate the most troublesome symptoms and to prevent future ones. The retaining dislocated bones, in their proper situation, may be compassed with less difficulty than in fractured bones; for luxations in the upper extremities seldom require any strict bandage, or long rest. But, when this happens in the lower extremities, the patient should rest some days in his bed, and not move the limb, till the joint has recovered its usual strength.

In a luxation of long standing likewise a bandage and rest are altogether necessary, till the former vigour of the ligaments is restored; though here, without a gentle motion, there will be danger of a stiffness. In the mean time it will be proper to bathe the bandages plentifully with some warm strengthening spirit. The bandages should be neither too tight, nor too lax. The application of plaisters, mean time, is rather pernicious than serviceable.

The treatment of the symptoms attending dislocations, as inflammations, tumours, pains, convulsions, and hæmorrhages, is the same as that in fractures and wounds; but after reduction they generally disappear insensibly. When the ligaments are very much debilitated, it is extremely serviceable, after having rubbed the part well with warm linen, to foment it with burnt rectified spirit of wine, and after that a quantity of some strengthening spirit, as directed in fractures, applying a proper bandage.

If a luxation is attended with a wound, the eighteen-headed bandage is proper. An abscess should be opened, as soon as it is ripe; for otherwise the pus will corrode the articulation or bone and produce a dangerous fistula, which can be remedied only by amputation. When the adjacent ligaments, tendons, and skin are broken and destroyed, the case is then, according to Hippocrates, absolutely incurable; and they will be so far from uniting firmly, that an attempt to reduce them will excite convulsions and a gangrene: for the preservation of life, therefore, the limb should be immediately amputated.

LYCANTHROPY, *Lycanthropia*, in physick, a species of madness or melancholy, in which the patients wander about in the night time, and in every thing imitate wolves. Some bite and snarl like dogs, and hence it has been called cynanthropy. In the time of the fit the patient should be treated with phlebotomy, the blood being suffered to run till he faint. Meats of good juice, with baths of sweet water, are to be prescribed. Whey is to be drank for three days together, and a purge of hiera or colocynthis twice or thrice administered. After purging, theriaca is to be exhibited, together with other things proper for the cure of melancholy.

LYCEUM,

LYCEUM, a celebrated ſchool at Athens, where Ariſtotle explained his philoſophy. It conſiſted of porticos and trees planted in the quincunx form, where the philoſophers diſputed walking.

LYCODONTES, in natural hiſtory, the petrified teeth of the lupus-piſcis, or wolf-fiſh, frequently found foſſile. They are of different ſhapes, but the moſt common kind riſe into a ſemiorbicular form, and are hollow within, ſomewhat reſembling an acorn-cup: this hollow is found ſometimes empty, and ſometimes filled with the ſtratum in which it is immerſed. Many of them have an outer circle, of a different colour from the reſt.

LYMPH, *Lympha*, in anatomy, a fine fluid, ſomewhat mucilaginous, ſeparated in the body from the maſs of blood, and contained in peculiar veſſels.

Below the parotides, toward the maſtoide apophyſis, is fixed a ſmall round gland, of an even ſurface; and it is the uppermoſt of a great number of glands of the ſame kind, which lie partly below the interſtice between the parotide and maxillary glands, and at different diſtances along the internal jugular vein, all the way to the lower part of the neck. Among theſe there is a great number of tranſparent veſſels, with an appearance of numerous valves, that contain lymph. The veſſels are called lymphatick veſſels, and the glands lymphatick glands. Some of theſe glands are oblong, thick, flat, and ſmall. The lymphatick veſſels go out alternately by one extremity from one gland, and enter by the other extremity ſome other gland near the former, the extremities in going out and entering being very much ramified. The trunk is commonly ſingle, and the valves are ſo diſpoſed that the fluid can only run toward the thorax, but cannot return to the head.

The lymph that comes from the head, neck, and arms, is thrown into the jugular and ſubclavian veins. All the lymphæducts in the thorax empty themſelves into the thoracick duct, and the lymph from all the reſt of the body flows to the receptacle of the chyle; ſo that, doubtleſs, its chief uſe is to dilute and perfect the chyle, before it mixes with the blood.

LYMPHATICKS, *Lymphæducts*, in anatomy, fine ſmall veſſels, that convey the lymph. See Lymph.

LYRA, a conſtellation in the northern hemiſphere; containing, in Ptolemy's and Tycho's catalogues, 10, and in the Britannick catalogue, 19 ſtars.

LYRE, *Lyra*, in antiquity, an inſtrument of the ſtringed kind, much uſed among the ancients.

From the lyre, which all agree to be the firſt inſtrument of the ſtringed kind in Greece, aroſe an infinite number of others, differing in ſhape and number of ſtrings, as the pſalterium, trigon, ſambucus, pectis, magadis, barbiton, teſtudo, the two laſt being uſed promiſcuouſly by Horace with the lyre and cithara, epigonium, ſimmicium, and pandura, which were all ſtruck with the hand, or a plectrum.

Lyre, among painters, &c. is an attribute of Apollo and the muſes.

LYRICK, ſomething ſung or played on the lyre; but more particularly it is applied to the ancient odes and ſtanzas, anſwering to our airs or ſongs, and may be played on inſtruments; though our madrigals degenerate much from their original the ode. This ſpecies of poetry was originally employed in celebrating the praiſes of gods and heroes; though it was afterwards introduced into feaſts and publick diverſions. Mr. Barnes ſhews how unjuſt it is to exclude heroick ſubjects from this ſort of verſe, which is capable of all the elevation ſuch matters require.

The characteriſtick of this kind of poetry is the ſweetneſs and variety of the verſe, the delicacy of the words and thoughts, the agreeableneſs of the numbers, and the deſcription of things moſt pleaſing in their own natures.

At firſt the verſe of the lyrick kind was only of one kind; but afterwards they ſo varied in the feet and numbers, that their ſorts are now almoſt innumerable. This kind of poem is diſtinguiſhed from all other odes by the happy tranſitions and digreſſions which it beautifully admits, and the ſurprizing and naturally eaſy returns to the ſubject, which is not to be obtained without great judgment and genius.

The lyrick is, of all kinds of poetry, the moſt poetical; and is as diſtinct, both in ſtile and thought, from the reſt, as poetry in general is from proſe. It is the boldeſt of all other kinds, full of rapture, and elevated from common language the moſt that is poſſible. Some odes there are likewiſe in the free and looſe manner, which ſeem to avoid all method, and yet are conducted by a very clear one; which affect tranſitions, ſeemingly without art, but for that reaſon have the more of it, delighting in exclamations and frequent invocations of the muſes; which begin and end abruptly, and are carried on through a variety of matter, with a ſort of divine pathos, above rules and the common forms of grammar. Pindar has ſet his ſucceſſors the example of digreſſions and excurſions.

To write a lyrick poem are required not only a flowing imagination, brightneſs, life, ſublimity, and elegance, but the niceſt art and fineſt judgment, ſo as to ſeem luxuriant, and not be ſo; and, under the ſhew of tranſgreſſing all laws, to preſerve them.

Thoſe digreſſions which quite leave the ſubject, and never return to it again, pleaſe leſs than ſome others of a very different kind. The former are defenſible, and ſometimes highly commendable; for a poet is not always obliged to dwell upon the ſame argument from one end to the other, and theſe are rather tranſitions than digreſſions. But the digreſſions which are chiefly to be admired, are ſuch as take occaſion from ſome adjunct or circumſtance of the ſubject, to paſs on to ſomewhat elſe not totally diſtinct from it, with which the imagination having been diverted for ſome time, new matter ſtarts up; and, from ſome new adjunct of that, the poet is brought back of a ſudden to his firſt deſign.

LYSIMACHIA, in botany, a genus of the pentandria monogynia claſs. The calix is rotated; and the capſule is roundiſh, with a ſharp point, and contains 10 valves. There are 11 ſpecies, five of them natives of Britain, viz. the vulgaris, or yellow willow-herb; the thyrſiflora, or tufted looſe-ſtrife; the nemorum, or yellow pimpernell of the woods; the nummularia, or money-wort; and the tenella, or purple money-wort.

M.

M, Or m, the twelfth letter and ninth consonant of our alphabet: it is a liquid and labial consonant, pronounced by striking or moving the under lip against the upper one; its sound is always the same in English; and it admits no consonant after it in the beginning of words and syllables, except in some Greek words, nor does it come after any in that case. It suffers not the sound of *n*, coming after it, to be heard, as in autumn, solemn, &c.

M, in prescription, signifies a maniple or handful; and at the end of a receipt it imports *misce*, or mingle.

M, in astronomy, &c. denotes meridional, southern; sometimes meridies, or mid-day.

M, in law, the brand of a person convicted of manslaughter, and admitted to the benefit of the clergy; it is burnt on the brawn of the left thumb.

M, among the ancients, was a numeral letter, signifying a thousand: when a dash was added at the top of it, as $\overline{M}$, it signified a thousand times a thousand.

MACARONICK, *Macaronian*, a kind of burlesque poetry, consisting of a jumble of words of different languages, with words of the vulgar tongue latinised, and Latin words modernised.

MACCABEES, two apocryphal books of Scripture; so called from Judas Mattathias, surnamed Maccabus.

MACE, *Macis*, the second coat or covering of the nutmeg.

It is a thin and flat membranous substance, of an oleaginous nature, a yellowish colour, extremely fragrant, and of a pleasant, but acrid and oleaginous taste. It is to be chosen new, not dry, and of a fragrant smell; tough, oleaginous, and of a good yellow.

Mace abounds with the same sort of oil that is found in the nutmeg; but it is thinner in the mace, and is in a greater quantity. If the oil be separated by distillation, what comes first over of it is thin and limpid like water, and is of the most fragrant smell; what follows this is yellowish, and somewhat thicker: and, finally, a third kind comes over, if the fire be made more violent, which is reddish; and all three of these are so subtile and volatile, that if they are not kept in vessels very close stopped, great part will evaporate into the air, all their finer parts flying off. An oil may also be drawn from mace, in the same manner as from nutmeg, by expression; it is afforded in a larger quantity this way, than from the nutmeg, and is of a somewhat softer consistence.

Mace is carminative, stomachick, and astringent; it possesses all the virtues of the nutmeg, if taken in a larger dose; and people have become delirious, for some hours, after an immoderate use of it. The oils of mace and nutmeg, whether prepared by distillation or by expression, are so much of the same nature, that they may be indiscriminately used for one another on all occasions. They give ease in cholicks, and often, in nephritick cases, taken internally from one drop to five or six of the distilled oil, or an equal quantity of the expressed; and externally, they are of use to rub up paralytick limbs; they also assist digestion, and will often stop vomiting and hiccoughs, only by being rubbed on the regions of the stomach. The nurses have a custom of applying oil of mace, by expression, to children's navels, to ease their gripes, and that often with success; and we are assured by authors of credit, that rubbed on the temples, it promotes sleep. The oils, by distillation, are very properly added to the stronger cathartics in form of pills, and prove excellent correctives.

MACHINE, *Machina*, in general, whatever hath force sufficient to raise or stop the motion of a heavy body.

Machines are either simple or compound; the simple ones are the seven mechanical powers, viz. lever, balance, pully, axis and wheel, wedge, screw, and inclined plane. See the articles, POWER, LEVER, BALANCE, &c.

From these the compound ones are formed by various combinations, and serve for different purposes; in all which, the same general law takes place, viz. that the power and weight sustain each other, when they are in the inverse proportion of the velocities they would have in the directions wherein they act if they were put in motion. Now, to apply this law to any compound machine, there are four things to be considered: 1. The moving power, or the force that puts the machine in motion; which may be either men or other animals, weights, springs, the wind, a stream of water, &c. 2. The velocity of this power, or the space it moves over in a given time. 3. The resistance, or quantity of the weight to be moved. 4. The velocity of this weight, or the space it moves over in the a given time.

The two first of these quantities are always in the reciprocal proportion of the two last; that is, the product of the first two must always be equal to that of the last: hence, three of these quantities being given, it is easy to find the fourth; for example, if the quantity of the power be 4, its velocity 15, and the velocity of the weight 2, then the resistance, or quantity of the weight, will be equal to $\frac{4 \times 15}{2} = \frac{60}{2} = 30$.

Compound machines are extremely numerous, as mills, pumps, wheel-carriages, clocks, fire-engines, &c. See ENGINE, MILL, PUMP, WATER-WORKS, &c.

In (*plate* LI. *fig*. 3.) is a compound machine, wherein are combined all the simple mechanical powers. It is contained in a frame ABCD, fastened by the nut *n* upon the stand *n* O, and held together by the pillars V W and B*q*. 1. The piece E F, whose fanes or flies may be put in motion by the wind, or drawn by a hair fastened at F, represents the lever and balance. 2. At right angles to this is joined the perpendicular spindle G H, having upon it the endless screw H, which may also be considered as a wedge. 3. This endless screw, or worm, takes the skew teeth of the wheel K, which is the axis in peritrochio; and, in turning round, winds up the string L M upon its axis, which passing round the pullies at M and N, or drawing by a tackle of five, raises the weight P. But as the screw has no progressive motion on its axis, it cannot here be said to take in the inclined plane; therefore, to make this engine take in all the mechanical powers, we may add the inclined plane *rq* QR, by making it rest on the ground at QR, and on the pillar *q*B at *rq*; whereby the force of the power, drawing at F, will be further increased in the ratio of QT, the length of the plane, to TS, its height. The whole force gained by this machine is found by comparing the space gone through by the point F, with the height that the weight is raised in any determinate number of revolutions of F; and this force is so considerable, than an hundred pounds weight at P will be easily raised by the hair of a man's head drawing at F.

In cranes, and many other machines, the power is so applied to one part of the machine, as to act immediately upon the weight; but there are others, as the engine for driving piles, in which the force of the power is accumulated, before the weight is acted on at all.

The following rules, which are taken from Mr. Emerson's Treatise, will direct the mechanick how he may contrive his machine, that it may answer the intended purpose to the best advantage:

1. Having assigned the proportion of your power and the weight to be raised, the next thing is to consider how to combine levers, wheels, pullies, &c. so that working together, they may be able to give a velocity to the

power,

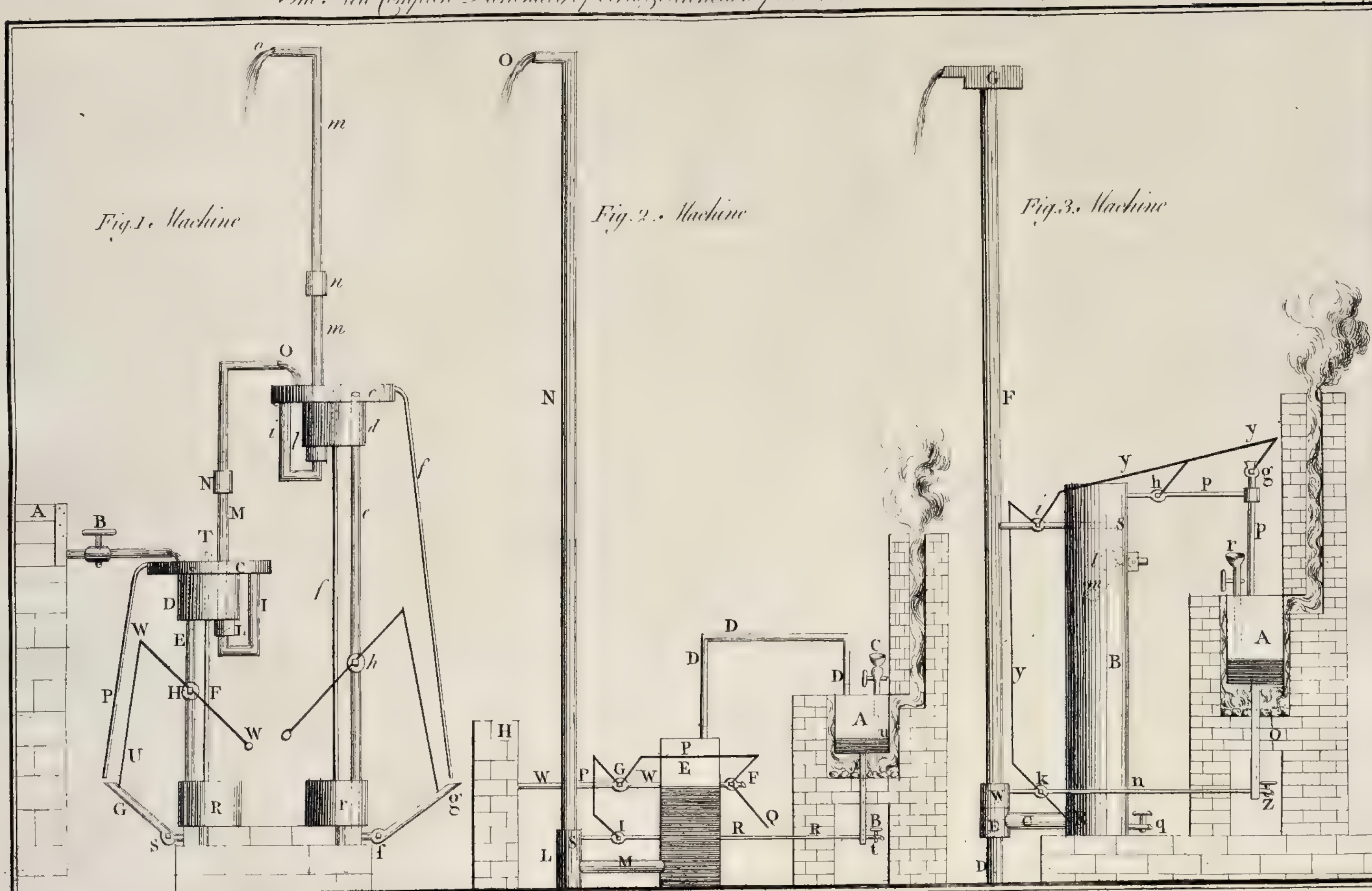

Plate L.

facing Machine.

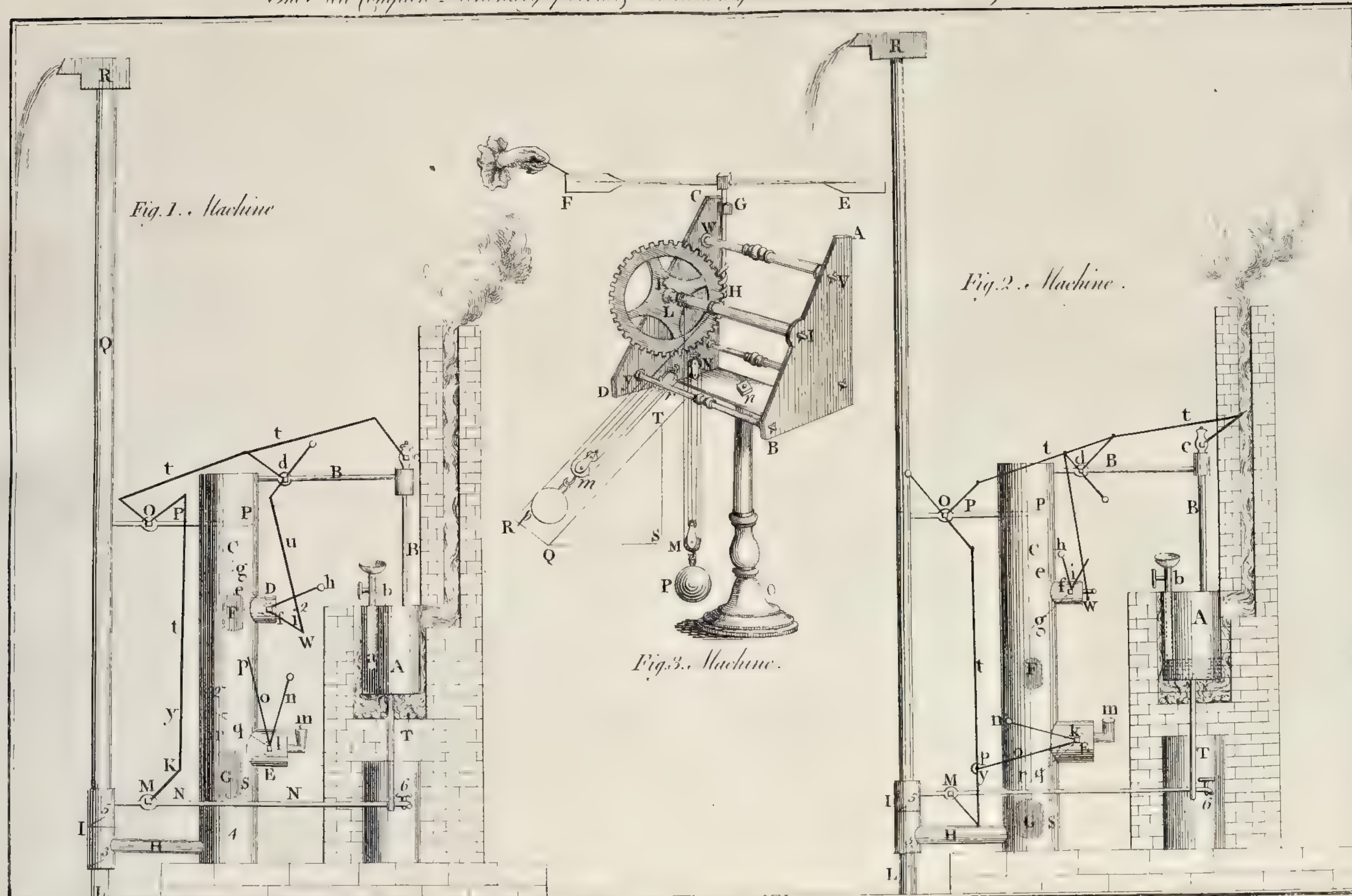

Plate LI.

facing Machine.

power, which ſhall be to that of the weight ſomething greater than in the proportion of the weight to the power. This done, you muſt eſtimate your quantity of friction, and if the velocity of the power be to that of the weight ſtill in a greater proportion than the weight and friction taken together is to the power; then your machine will be able to raiſe the weight. And note, this proportion muſt be ſo much greater, as you would have your engine work faſter.

2. But the proportion of the velocity of the power and weight muſt not be made too great neither: for it is a fault to give a machine too much power, as well as too little. For if the power can raiſe the weight and overcome the reſiſtance, and the engine perform its proper effect in a convenient time, and works well, it is ſufficient for the end propoſed. And it is in vain to make more additions to the engine to increaſe the power any further; for that would not only be a needleſs expence, but the engine would loſe time in working.

3. As to the power applied to work the engine, it may be either a living power, as men, horſes, &c. or an artificial power, as a ſpring, &c. or a natural power, as wind, water, fire, weights, &c.

When the quantity of the power is known, it matters not as to the effect what kind of power it is; for the ſame quantity of any ſort will produce the ſame effect. And different ſorts of powers may be applied in an equal quantity, a great variety of ways.

The moſt eaſy power applied to a machine is weight, if it be capable of effecting the thing deſigned. If not, then wind, water, &c. if that can conveniently be had, and without much expence.

A ſpring is alſo a convenient moving power for ſeveral machines. But it never acts equally as a weight does; but is ſtronger when much bent, that when but a little bent, and that in proportion to the degree of bending, or the diſtance it is forced to. But ſprings grow weaker by often bending, or remaining long bent; yet they recover part of their ſtrength by lying unbent.

The natural powers of wind and water may be applied with vaſt advantage to the working of great engines when managed with ſkill and judgment. The due application of theſe has much abridged the labours of men. For there is ſcarce any labour to be performed, but an ingenious artificer can tell how to apply theſe powers to execute his deſign, and anſwer his purpoſe. For any conſtant motion being given, it may, by due application, be made to produce any other motions we deſire. Therefore theſe powers are the moſt eaſy and uſeful, and of the greateſt benefit to mankind. Beſides, they coſt nothing nor require any repetition or renewing, like a weight or a ſpring, which require to be wound up. When theſe cannot be had, or cannot ſerve our end, we have recourſe to ſome living power, as men, horſes, &c.

4. Men may apply their ſtrength ſeveral ways in working a machine. A man of ordinary ſtrength, turning a roller by the handle, can act for a whole day againſt a reſiſtance equal to thirty pounds weight; and if he work ten hours in a day, he will raiſe a weight of 30lb. $3\frac{1}{2}$ feet in a ſecond; or if the weight be greater, he will raiſe it ſo much leſs in proportion. But a man may act, for a ſmall time, againſt a reſiſtance of 50lb. or more.

If two men work at a windlaſs or roller, they can more eaſily draw up 70lb. than one man can 30lb. provided the elbow of one of the handles be at right angles to that of the other. And with a fly or heavy wheel applied to it, a man may do one-third part more work; and for a little while act with a force, or overcome a continual reſiſtance, of 80lb. and work a whole day when the reſiſtance is but 40lb.

Men uſed to carrying, ſuch as porters, will carry ſome 150lb. others 200 or 250lb. according to their ſtrength.

A man can draw but about 70 or 80lb. horizontally; for he can but apply about half his weight.

If the weight of a man be 140lb. he can act with no greater force in thruſting horizontally, at the height of his ſhoulders, than 27lb.

A horſe draws to greateſt advantage, when the line of direction is a little elevated above the horizon, and the power acts againſt his breaſt; and can draw 200lb. for eight hours in a day, a two miles and a half an hour. If he draws 240lb. he can work but ſix hours, and not quite ſo faſt; and in both caſes, if he carries ſome weight, he will draw better than if he carried none. And this is the weight a horſe is ſuppoſed to be able to draw over a pully out of a well. In a cart, a horſe may draw 1000lb. The moſt force a horſe can exert is when he draws ſomething above a horizontal poſition.

The worſt way of applying the ſtrength of a horſe, is to make him carry or draw up a hill. And three men, with 100lb. on their backs, will climb up a ſteep hill faſter than a horſe with 300lb.

A round walk for a horſe to draw in, at a mill, &c. ſhould not be leſs than forty feet diameter.

5. Every machine ought to be made of as few parts, and thoſe as ſimple as poſſible, to anſwer its purpoſe; not only becauſe the expence of making and repairing will be leſs, but it will alſo be leſs liable to any diſorder. And it is needleſs to do a thing with many, which may be done with fewer parts.

6. If a weight is to be raiſed but a very little way, the lever is the moſt ſimple, eaſy, and ready machine. Or if the weight be very great, the common ſcrew is moſt proper. But if the weight is to be raiſed a great way, the wheel and axle is a proper power, and blocks and pullies are eaſier ſtill; and the ſame may be done by help of the perpetual ſcrew.

Great wheels to be wrought by men or cattle are of moſt uſe and convenience, when their axles are perpendicular to the horizon; but if by water, &c. then it is beſt to have their axles horizontal.

7. As to the combination of ſimple machines together, to make a compound one; though the lever when ſimple cannot raiſe a weight to any great height, and in this caſe is of little ſervice; yet it is of great uſe when compounded with others. Thus the ſpokes of a great wheel are all levers perpetually acting; and a beam fixed to the axis to draw the wheel about by men, or horſes, is a lever. The lever alſo may be combined with the ſcrew, but not conveniently with pullies or with the wedge. The wheel and axle is combined with great advantage with pullies. The ſcrew is not well combined with pullies; but the perpetual ſcrew combined with the wheel is very ſerviceable. The wedge cannot be combined with any other mechanical power; and it only performs its effect by percuſſion; but this force of percuſſion may be increaſed by engines.

Pullies may be combined with pullies, and wheels with wheels. Therefore if any ſingle wheel would be too large, and take up too much room, it may be divided into two or three more wheels and trundles, or wheels and pinions, as in clock-work; ſo as to have the ſame power, and perform the ſame effect.

In wheels with teeth, the number of teeth which play together in two wheels ought to be prime to each other, that the ſame teeth may not meet at every revolution; for when different teeth meet, they by degrees wear themſelves into a proper figure: therefore they ſhould be contrived that the ſame teeth meet as ſeldom as poſſible.

8. The ſtrength of every part of the machine ought to be made proportional to the ſtreſs it is to bear. And therefore let every lever be made ſo much ſtronger, as its length and the weight it is to ſupport is greater; and let its ſtrength diminiſh proportionally from the fulcrum, or point where the greateſt ſtreſs is, to each end. The axles of wheels and pullies muſt be ſo much ſtronger as they are to bear greater weight. The teeth of wheels, and the wheels themſelves, which act with greater force, muſt be proportionally ſtronger. And in any combination of wheels and axles, make their ſtrength diminiſh gradually from the weight to the power, ſo that the ſtrength of every part be reciprocally as the velocity it has. The ſtrength of ropes muſt be according to their tenſion, and that is as the ſquares of their diameters. And in general whatever parts a machine is compoſed of, the ſtrength of every particular part of it muſt be adjuſted to the ſtreſs upon it; therefore in ſquare beams the cubes of the diameters muſt be made proportional to the ſtreſs they bear. And let no part be ſtronger or bigger than is neceſſary for the ſtreſs upon it; not only for the eaſe and well going of the machine, but for diminiſhing the friction. For all ſuperfluous matter in any part of it, is nothing but a dead weight upon the machine, and ſerves for nothing but to clog its motion. And he is by no means a perfect mechanick, that does only adjuſt the ſtrength to the

the ftrefs, but who alfo contrives all the parts to laft equally well, that the whole machine may fail together.

9. To have the friction as little as poffible, the machine ought to be made of the feweft and fimpleft parts. The diameters of the wheels and pullies ought to be large, and the diameters of the arbors or fpindles they run on, as fmall as can be confiftent with their ftrength. All ropes and cords muft be as pliable as poffible, and for that end rubbed with tar or greafe; the teeth of wheels muft be made to fit and fill up the openings; and cut into the form of epicycloids. All the axles, where the motion is, and all teeth where they work, and all parts that in working rub upon one another, muft be made fmooth; and when the machine goes, muft be oiled or greafed.

10. When any motion is to be long continued, contrive the power to move or act always one way, if it can be done. For this is better and eafier performed than when the motion is interrupted, and the power is forced to move firft one way and then another; becaufe every new change of motion requires a new additional force to effect it. Befides, a body in motion cannot fuddenly receive a contrary motion, without great violence. And the moving any part of the machine contrary ways by turns, with fudden jerks, tends only to fhake the machine to pieces.

11. In a machine that moves always one way, endeavour to have the motion uniform.

12. But when the nature of the thing requires that a motion is to be fuddenly communicated to a body, or fuddenly ftopped; to prevent any damage or violence to the engine, by a fudden jolt, let the force act againft fome fpring, or beam of wood, which may fupply the place of a fpring.

13. In regard to the fize of the machine; let it be made as large as it can conveniently. The greater the machine, the exacter it will work, and perform all its motions the better. For there will always be fome errors in the making, as well as in the materials; and confequently in the working of the machine. The refiftance of the medium in fome machines has a fenfible effect. But all thefe mechanical errors bear a lefs proportion to the motion of the machine in great machines than in little ones; being nearly reciprocally as their diameters; fuppofing they are made of the fame matter, and with the fame accuracy, and are equally well finifhed: therefore in a fmall machine they are more fenfible; but in a great one almoft vanifh: therefore great machines will anfwer better than fmaller, in all refpects, except in ftrength. For the greater the machine, the weaker it is, and lefs able to refift any violence.

14. For engines that go by water, it is neceffary to meafure the velocity and force of the water. To get the velocity, drop in pieces of fticks, &c. and obferve how far they are carried in a fecond, or any given time.

But if it flows through a hole in a refervoir, or ftanding receptacle of water, the velocity will be found from the depth of the hole below the furface.

Thus let $s=16\frac{1}{12}$ feet. $v=$ velocity of the fluid per fecond. $B=$ the area of the hole. $H=$ height of the water; all in feet. Then the velocity $v=\sqrt{2sH}$; and its force $=$ the weight of the quantity $\frac{vv}{2s}B$ or HB of water, or $=\frac{62\frac{1}{2}}{112}HB$ hundred weight: becaufe a cubick foot is $=62\frac{1}{2}$ lb. avoird. Alfo a hogfhead is about $8\frac{1}{2}$ feet, or 531 lb. and a ton is four hogfheads.

When you have but a fmall quantity of water, you muft contrive it to fall as high as you can, to have the greater velocity, and confequently more force upon the engine.

15. If water is to be conveyed through pipes to a great diftance, and the defcent be but fmall; fo much larger pipes muft be ufed, becaufe the water will come flow.

Water fhould not be driven through pipes fafter than four feet per fecond, by reafon of the friction of the tubes. Nor fhould it be much wire-drawn, that is, fqueezed through fmaller pipes; for that creates a refiftance, as water-way is lefs in narrow pipes.

16. When any work is to be performed by a water wheel, moved by the water running under it and ftriking the paddles, or ladle boards; the channel it moves in ought to be fomething wider than the hole of the adjutage, and fo clofe to the floats on every fide, as to let little or no waterpafs; and when paft the wheel, to open a little that the water may fpread. It is of no advantage to have a great number of floats, or paddles, for thefe paft the perpendicular are refifted by the back water, and thofe before it are ftruck obliquely. The greateft effect that fuch a wheel can perform, in communicating any motion, is when the paddles of the wheel move with $\frac{1}{3}$ the velocity of the water; in which cafe, the force upon the paddles is $\frac{4}{9}$ only; fuppofing the abfolute force of the water againft the paddle, when the wheel ftands ftill, to be 1. So that the utmoft motion which the wheel can generate, is but $\frac{4}{27}$ of that which the force of the water againft the paddles at reft, would produce. This is when the wheel is at the beft; but oftentimes far lefs is done.

There is ftill another fpecies of machine, which acts by a diftinct power, the compreffion and expanfion of air: and the following inftances will fufficiently explain the manner in which that power acts.

They were invented and brought to perfection by the ingenious Mr. Blakey; who has obtained his majefty's patent for fecuring to himfelf the advantages that may refult from their ufe.

Plate XLVIII. *fig.* 1. is a fountain which acts by compreffion of air; it confifts of four cocks and pipes, with two copper veffels, one above the other; it could have been made with one cock and pipe lefs, but in order to render it more clear, it was thought better to fhew two diftinct tubes, for the water to be feen running from one, while it is ftopped in the other.

To fet this machine in action, the veffels E and L being empty, the cocks O and B muft be opened, which lets water run from the ciftern A through the pipe C, into the funnel D, and the veffel E, and will go out at N when E is full. Then B, D, and O, muft be fhut, and F opened, which laft lets water run from the ciftern A into the funnel H, down the pipe I into the veffel L: as it fills, the water forces the air to rife through the pipe M into the veffel E, and preffes on the furface of the water therein, which makes it afcend and form a pleafant jet, P, which lafts till all the water is out of the veffel E: when the jet rifes no more, F muft be fhut, and O, D, and B, muft be opened, which lets the water run from A into E; at the fame time the water runs out at O, which, when all out, O, D, and B, muft be fhut. And by repeatedly turning the cocks, as above, the fountain can be made to play as long as there is water in the ciftern A.

Plate L. *fig.* 1. is a machine put in action by compreffion of air, and works itfelf. The whole confifts of copper veffels and pipes divided into ftages, in proportion to the firft fall of water, and the height wanted to be raifed. The height of the firft ftage is fixed from B to the level of the cock S. The height of the fecond ftage is taken from the orifice O, of the conducting pipe M, to the level of the fame cock S.

In the firft apparatus, a fpring of water runs from the trough or refervoir A through the cock B; C is a ciftern over the veffel B, which is joined by the water pipe E, and air pipe F, to the under veffel R; G is a balanced trough which is faftened to the key of the cock S, which is to turn the cocks H and S; I is a communicating pipe from the ciftern C to the veffel D; L is a valve in which is a clack, which rifes to let the water run from the ciftern C through the pipe I into the veffel D; M is a conducting pipe which has a valve N, and in it a clack, which rifes to let the water go up and pour out at the orifice O; P is a conducting pipe to receive water from the ciftern C, that it fhould not be overflowed. This makes the firft ftage, which anfwers nearly to what is called a lift in hydraulick works.

The fecond ftage of apparatus is marked with italick letters, *c* is the ciftern over the veffel *d*, which is joined by the water-pipe *e*, and air-pipe *f*, to the under veffel *r*; *g* is a balanced trough, which is faftened to the key of the cock *f*, which is to turn the cocks *h* and *f*; *i* is a communicating pipe from the ciftern *c* to the veffel *d*; *l* is a valve, in which is a clack, which rifes to let the water run from the ciftern *c*, through the pipe *i* into the veffel *d*; *m m* is a conducting pipe; *n* is a valve, in which is a clack which rifes to let the water go up and pour out at the orifice *o*; *p* is a conducting pipe.

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In order to set this machine at work, the balanced trough G must be pressed down, and the cock B opened, which lets water run into the cistern C, through the pipe I, raises the clack in the valve L, and fills the vessel D, which when full, the water rises in the cistern C till it is up to the orifice of the pipe E; then the balanced trough is let loose, which rises and opens the clack H, and shuts the cock S. As the water runs down the pipe E through the cock H into the vessel R, it is stopped by the cock S and rises in R, which obliges the air in the said vessel R to rise through the air-pipe F; which air-pipe is capped at T, and the cap soldered to the upper part of the vessel D, the air goes down the said cap and through a few holes made on the top of the vessel D, in the inside of the cap T, and so is forced to press on the surface of the water in the vessel D, and presses on the clack D, goes up M, raises the clack in the valve N, and runs out at the orifice O. When all the water is out of the vessel D, it rises in the cistern C, and runs out at the orifice of the conducting pipe P, which loads the balanced trough G, makes it fall, and pulls the rod U that is fastened to the turn-key W, which shuts the cock H. At the same time, the trough G falls, and opens the cock S, to the key of which the balanced trough is fastened. As soon as S is opened, it lets out the water from R, which increases the weight of G, and makes it fall down very quick, and entirely opens the cock S for the water in the vessel R to run out freely. At the same time that the cock S is opened, the water in the cistern C runs through the pipe I, lifts up the clack L, and rises in the vessel D, which is as soon full as the vessel R is empty. When all the water is out of the vessel R, the balanced trough G rises and shuts the cock S, and opens H; and as the water continually runs out from B, it soon fills the cistern C, and goes down the pipe E, and repeats the same operation as before, enforcing the water up the pipe M, out at the orifice O, and so continues the first apparatus as long as the water runs out at the cock B.

The second apparatus is worked in the same manner, excepting that instead of the trough or reservoir A, and the water's running out of the cock B, the water runs out of the orifice O, of the pipe M in the first apparatus into the cistern *c*, and through the pipe *i*, &c.

Plate L. *fig.* 2. is a hand machine, works by power of expansion and condensation of air; will force up any quantity of water, in proportion to the size and strength of the vessels, which consist of a boiler A, its pipe B, and its cock *t*; on the cover of A is fastened a funnel C, with the gage pipe *u*; D, D, D, is the steam-pipe, which goes from the boiler A to the receiver E; G is a large cock, fastened to the pipe W W, which lets water run from the cistern H into the receiver E; F is an air-cock; I is a little cock which lets water run from the clack-box L, through R R and B, to feed the boiler A; M is a communicating pipe from the receiver E to the clack-box L; N is a conducting pipe, through which the water is made to rise and fall out of the orifice O; P, P, are the communicating rods pinned to the turn-keys of the above mentioned cocks; Q is the handle with which the cocks are opened and shut; *t* is a cock to let water out from the boiler.

To make this machine work, the handle Q must be hoisted up, which pushes the cummunicating rods P P, and opens the air-cock F, the cock G (which G lets water run from the cistern H into the receiver E) and the little cock I, which is to feed the boiler A. When the water begins to run out of the cock F, the handle Q must immediately be pushed down, which shuts the cocks I, G, and F. Water must then be poured into the funnel C; which water falls into the boiler A, till it rises up to the orifice of the gauge pipe *u*; then the funnel cock must be shut.

Fire now must be made under the boiler A, which makes the water boil and steam, to rise, and force itself through the pipe D D D, on the air which is upon the surface of the water in the receiver E; which air presses the water down, and through the pipe M, raises the clack S, runs up N, and out at the orifice O, till all the water is expelled from the receiver E, when the air instantaneously follows, and causes a great gush of water to fly out of the orifice O; after which the handle Q must be hoisted up again, to begin another operation: and thus may the machine be kept working as long as fire is under the boiler A.

This engine is very proper for supplying houses or gardens with water; the effects of it are simple, and may be conceived by the meanest capacities.

Plate L. *fig.* 3. This machine is made to work by the powers of condension and expansion; the first of these powers have the advantage of raising water into a cylinder of any size, even if it could be made to contain a thousand tons; but this power of condension is limited in the height to which it can make water rise.

This engine consists of a boiler A; a cylinder B; a communicating pipe C; a suction-pipe D, with a clack-box E; conducting pipe F, with its reservoir G. *h* is the steam-cock; *i* is the injecting-cock; *g* is a valve-cock; *k* is the boiler's small leading cock; *o* is the boiler's pipe; *p p* is the steam-pipe; *l* is an air cock and valve; *m* is a turn-key, and X a floater fastened to the turn-key *m*; *q* is a cock made use of occasionally, to let off air; *z* is a cock to let out water from the boiler.

To set this machine at work, water must be poured into the reservoir G till it is full; then the cock *q* must be opened; after which, water must be poured into the funnel *r*, till it rise in the boiler A, up to the orifice of the gauge-pipe, &c.

Now fire must be made under the boiler A, which makes the water in it to boil, steam to rise, which runs through the pipe *p p*, into the cylinder B, and forces all the air out of the cock *q*; then the steam follows with great noise and velocity. A few seconds after this steam has shewed its force, the cock *q* must be shut, and immediately the handle R must be pushed up a quarter of a circle, which moves the communicating rods *y*, *y*, *y*, and instantaneously opens the cock *g*, shuts *h*, opens the injection-cock *i*, and the boiler's little feeding cock *k*. The opening of the cock *g* lets the steam off from the boiler A; which steam was stopped from going into the cylinder B, by the cock *h* being shut; the cock *i* being open, lets fly a jet of cold water, which strikes the upper part of the cylinder B, and dashes on all sides from the pipe *s*; condenses the hot steam, and causes a vacuum in the cylinder B, which immediately forces the water to rush up the suction-pipe D, lifts up the under clack *w*, runs through the pipe C into the cylinder B, and rises till it comes to the floater X, which is at the end of the turn-key *m*; which floater rising, opens the valve-cock *l*, that lets the air force itself into the cylinder B with great noise, and stops the water from going higher. While the condensation is forming, the little cock *k* is open, which lets water run through the pipe *n*, and up O into the boiler A. As soon as the noise is over of the air's forcing itself in at the valve-cock *l*, (which is the sign that the condensation has no more power) the handle R must be pulled down, which shuts *k* and *i*, and opens *h* and *g*; the doing of which lets the steam press on the air, and force the water down the cylinder B, through the pipe C, presses on the clack *w*, rises up F, and runs out at G. At the same time the floater X falls, and shuts the cock *l*; and when the water is down to the level of the pipe C, the air rushes violently up the pipe F, with great noise, and causes a gush of water to fly out 20 or 30 feet above the reservoir G; then finishes the power of expansion, to begin that of condensation; both which can be renewed when desired, if fire is kept under the boiler.

This machine is more proper than the first for supplying houses and gardens with water, as there is no need of a spring of water to fill the receiver, the condensation being able to bring up the water 25 feet before it is pushed by the stream.

Plate LI. *fig.* 1, 2. This machine works itself by the powers of condensation and expansion. It consists of a boiler A, with the steam-pipe B B; a cylinder C; two cylindrical boxes D and E; an upper floater F, and an under one G; a communicating pipe H, a clack barrel I, and a suction-pipe L; the boiler's feeding-cock M, with its pipe N N T; the injection-cock O, with its pipe P P; the conducting-pipe Q, and the reservoir R. In the boiler A is a gauge-pipe *a*, with the funnel-cock *b*. On the first limb of B is a valve-cock *c*: *d* is the steam. In the regulating box D is a valve *e*, and its cock *f*. On the inside square of the key of the cock *f* is fastened the arm *g*; to its end hangs a floater F (as in *fig.* 2.)

fig. 2.); on the outside square of the key of the cock *f* is an arm loaded with a leaden bob *h*; *i* is another arm on the same square, which has a hole at its end, to let the rod *u* slip through it. In the regulating box E is the square of the key of the under valve-cock *l*, to which is fastened the arm *q*, at the end of which is a hole to let the rod *r* slide through; *m* is the valve; *n* is the loaded arm; *o* is the ketch-arm, with its hook *p*; *s* is a pipe to conduct the air and steam through the cock *l*, and out at the valve *m*; *t*, *t*, *t*, are communicating rods from the turn-keys of the different cocks; *n* is a rod which hangs by a pin, at the end of one of the turn-keys of the cock *d*, and runs through the hole in the arm *i*; *w* is a pin at the end of the rod *u*; *c* is a cock to let out the water from the boiler A.

To set this machine at work, the cock M and O must be shut, and their turn-keys stand as they appear in *fig.* 1. then water must be poured into the reservoir R till it is full; after which, water must be poured into the funnel *b*, which falls into the boiler A; when the water is up the orifice of the gauge pipe *a*, the cock *b* must be shut; then the regulating bob must be overset (as in *fig.* 2.) the pin *y* being taken out of the rod *t*, that all the rods and turn-keys may be in the situation they appear in at *fig.* 1. the cock *l* being then open.

Fire must now be made under the boiler A, to generate steam, which forces itself through the pipe B B into the cylinder C, rises up *s*, runs through the cock , lifts up the valve *m*. in going out; the steam follows with great noise. A few seconds after, the turn-key *x* must be pushed down (as in *fig.* 2.) and the pin *y* must immediately be put in its place, which opens *m* and O, shuts *d*, and opens *c*; raises the rod *u* and its pin *w* to the level of the centre of the key of the valve-cock F.

In opening *c*, it lets off the steam from the boiler A; on shutting *d*, it stops the steam from going into the cylinder C; in opening O, it lets cold water jet out of the pipe P, into the cylinder C; in opening M, it lets water run through the pipe N N, and up T, to feed the boiler A.

From the cold water jetting out of holes in P (as in *fig.* 2.) it condenses all the hot steam in the cylinder C, and causes a vacuum, which makes the atmosphere press on the valve *m*, and on the water (in which the suction-pipe is immerged) which rises with great velocity in the pipe L, lifts up the clack 3, runs through *b* into the cylinder C, makes the floater rise and push up the arm *q*, which turns and shuts the cock *l*; raises the arm *o*, oversets the bob arm *n*, and puts the under regulator in the situation it appears in *fig.* 1. The floater G can rise no further, it being fastened to a chain of a fixed length; but the water keeps rising till it comes up to the floater F, which pushes up the arm *g*, (as in *fig.* 2.) and oversets the bob *h*, (as in *fig.* 1.) and entirely opens the cock *f*, which lets the cock run in freely to lift up the valve *e*, and stops the water from rising higher, as well as terminates the power of condensation.

When the arm *i*, has pulled down the pin *w*, (as in *fig.* 2.) which shuts *c*, O, and M, and opens *d*, the steam runs into the cylinder C, which presses on the air, and forces the water to run through H, loads and shuts the clack 3, raises the clack 5, passes up the pipe Q, and runs out at R. As the water is falling in the cylinder C, it makes the floater F descend, and hang by the arm *g*, (as in *fig.* 2.) which from its weight turns the key and shuts the cock *f*. The waters falling lower, the floater G goes down, and makes the pin 2 pull the inside arm *q*, which oversets the bob arm *n*, and the ketch arm *o*, whose hook *p*, presses on *y*, (as in *fig.* 1.) and pulls down the rod *t*, which opens the cocks, M and O, shuts *d* and opens *c*, and causes an immediate condensation and vacuum, which renews another operation as before, and so will continue as long as fire is kept under the boiler A.

Mr. Blakey adds, that when he began to compose his machines at large, he was persuaded to make use of cast iron; and accordingly he made a cylindrical boiler of 24 inches diameter and 10 feet long, with a receiver and pipes of the same metal; the boiler was about an inch and a half thick, which being surrounded with fire, caused a great quantity of steam; but when the steam raised up the water with a force of about 4980, and the cold water was injected to cause a condensation, the cylinder cracked, and let out the air and steam, which prevented any further experiments on cast iron. Ever since he has made use of copper, and has found that vessels of the 20th part of that thickness have supported 28000 weight without bursting.

Having thus surmounted the principal difficulty, the rest, if any yet remain, will be easily conquered, and the inventor rewarded in proportion to the pains he has taken to bring such useful machines to perfection.

MACHINERY, in epick and dramatick poetry, is when the poet introduces the use of machines, or brings some supernatural being upon the stage, in order to solve some difficulty, or to perform some exploit out of the reach of human power. The ancient dramatick poets never made use of machines, unless where there was an absolute necessity for so doing; whence the precept of Horace,

> *Nec Deus intersit, nisi dignus vindice nodus*
> *Inciderit.*

It is quite otherwise with epick poets, who introduce machines in every part of their poems; so that nothing is done without the intervention of the gods. In Milton's Paradise Lost, by far the greater part of the actors are supernatural personages. Homer and Virgil do nothing without them; and in Voltaire's Henriade, the poet has made excellent use of St. Louis.

As to the manner in which these machines should act, it is sometimes invisibly, by simple inspirations and suggestions; sometimes by actually appearing under some human form; and, lastly, by means of dreams and oracles, which partake of the other two. However, all these should be so managed as to keep within the bounds of probability.

MACKREL, in ichthyology, a species of scomber, with five pinnules at the extremity of the back, and a spine at the anus.

MACROCOSM, the great world, or universe, in contradistinction to man, called microcosm, as containing a world of wonders within himself.

MACULÆ, in astronomy, dark spots appearing on the luminous faces of the sun, moon, and even some of the planets; in which sense they stand contradistinguished from faculæ. See FACULÆ.

These spots are most numerous and easily observed in the sun. It is not uncommon to see them in various forms, magnitudes, and numbers, moving over the sun's disk. They were first of all discovered by the Lyncean astronomer Galileo, in the year 1610, soon after he had finished his new invented telescope. That these spots adhere to, or float upon, the surface of the sun, is evident for many reasons. 1. Many of them are observed to break out near the middle of the sun's disk; others to decay and vanish there, or at some distance from his limb. 2. Their apparent velocities are always greatest over the middle of the disk, and gradually slower from thence on each side towards the limb. 3. The shape of the spots varies according to their position on the several parts of the disk: those which are round and broad in the middle, grow oblong and slender as they approach the limb, according as they ought to appear by the rules of opticks.

By comparing many observations of the intervals of time in which the spots made their revolution, by Galileo, Cassini, Scheiner, Hevelius, Dr. Halley, Dr. Derham, and others, it is found that 27 days, 12 hours, 20 minutes, is the measure of one of them at a mean; but in this time the earth describes the angular motion of 26° 22′, about the sun's centre; therefore say, as the angular motion of 360°+26° 22′, is to 360°; so is 27 days, 12 hours, 20 minutes, to 25 days, 15 hours, 16 minutes; which, therefore, is the time of the sun's revolution about its axis.

As to the magnitude of the spots, they are very considerable, as will appear if we observe that some of them are so large as to be plainly visible to the naked eye; thus Galileo saw one of them in the year 1612, and Mr. Martin assures us, that he knew two gentlemen that thus viewed them within a few years past; whence he concludes, that these spots must therefore subtend, at least, an angle of one minute. Now the diameter of the earth, if removed to the sun, would subtend an angle of but 20″; so that the diameter of a spot, just visible to the naked

naked eye, is, to the diameter of the earth, as 60 to 20, or as three to one; and, therefore, the surface of the spot, if circular, to a great circle of the earth, is as 9 to 1; but four great circles are equal to the earth's superficies; whence the surface of the spot is, to the surface of the earth, as 9 to 4, or as $2\frac{1}{4}$ to 1. Gassendus says, he saw a spot whose diameter was equal to $\frac{1}{50}$ of that of the sun, and therefore subtended an angle at the eye of 1' 3"; its surface was therefore 5 times larger than the surface of the whole earth.

What these spots are, it is presumed, no body can tell; but they seem to be rather thin substances than solid bodies, because they lose the appearance of solidity in going off the disk of the sun: they resemble something of the nature of scum or scoria, swimming on the surface, which are generated and dissolved by causes little known to us: but whatever these solar spots are, it is certain they are produced from causes very inconstant and irregular; for Scheiner says he frequently saw 50 at once, but for 20 years after scarce any appeared. And in this century the spots were very frequent and numerous till the year 1741, when, for three years successively, very few appeared; and now, since the year 1744, they have again appeared as usual.

These maculæ are not peculiar to the sun, they have been observed in all the planets. Thus Venus was observed to have several by Signior Bianchini, in the year 1726. As in Venus, so in Mars, both dark and bright spots have been observed, first by Galileo, and afterwards by Cassini, &c. Jupiter has had his spots observable ever since the invention and use of the large telescopes. Saturn, by reason of his great distance on one hand, and Mercury, by reason of his smallness and vicinity to the sun on the other, have not as yet had any spots discovered on their surfaces, and consequently nothing in relation to their diurnal motions and inclinations of their axis to the planes of their orbits can be known, which circumstances are determined in all the other planets, as well as in the sun, by means of these maculæ.

The spots, or maculæ, observable on the moon's surface, seem to be only cavities or large caverns, on which the sun shining very obliquely, and touching only their upper edge with his light, the deeper places remain without light; but as the sun rises higher upon them, they receive more light, and the shadow or dark parts grow smaller and shorter, till the sun comes at last to shine directly upon them, and then the whole cavity will be illustrated: but the dark, dusky spots, which continue always the same, are supposed to proceed from a kind of matter or soil which reflects less light than that of the other regions. See Moon.

MADDER, *Rubia*, in botany, a genus of plants, whose flower is monopetalous, campanulated, and divided into four segments; it hath four subulated filaments, which are shorter than the corolla; these are topped by simple antheræ. The fruit consists of two smooth berries growing together, each containing a single, roundish, umbilicated seed.

Madder is cultivated in vast quantities in several parts of Holland; the Dutch supply all Europe with it, and make a great advantage by trading in it. What they send over, for the use of the dyers, is ground into a coarse powder, of which there are two kinds: the one is the whole root ground, and the other is that which is first cleaned from the cortical part, and then ground to a powder; this last is of a paler and more agreeable colour.

In medicine, the root is attenuant, and has the credit of being a vulnerary of the first rank. It is given in chronical cases, where there are obstructions of the viscera; and is good in the jaundice, dropsy, and obstructions of the spleen; its dose is from 5 grains to 15, but is seldom given singly. Madder has one very uncommon property, that is, it will turn the bones red of those animals that have fed upon it some time.

MADNESS, *Mania*, a most dreadful kind of delirium, without a fever.

Melancholy and madness may very justly be considered as diseases nearly allied; for they have both the same origin, that is, an excessive congestion of blood in the brain: they only differ in degree, and with respect to the time of invasion; melancholy being the primary disease, of which madness is the augmentation. Both these diseases suppose a weakness of the brain, which may proceed from an hereditary disposition; from violent disorders of the mind, especially long continued grief, sadness, anxiety, dread, and terror; from close study and intense application of mind to one subject; from narcotick and stupefying medicines; from previous diseases, especially acute fevers; from a suppression of hæmorrhages, and omitting customary bleeding; from excessive cold, especially of the lower parts, which forces the blood to the lungs, heart, and brain; and from violent anger, which will change melancholy into madness.

It is evident from observation, that the blood of maniack patients is black, and hotter than in the natural state; that the serum separates more slowly and in a less quantity than in healthy persons; and that the excrements are hard, of a dark red or greyish colour, and the urine light and thin.

The antecedent signs of madness are a redness and effusion of the eyes with blood, a tremulous and inconstant vibration of the eye-lids, a change of disposition and behaviour, supercilious looks, a haughty carriage, disdainful expressions, a grinding of the teeth, and unaccountable malice to particular persons; also little sleep, a violent head-ach, quickness of hearing, incredible strength, insensibility of cold; and in women, an accumulation of blood in the breasts, in the increase of this disorder.

Diseases of the mind have something in them so different from other disorders, that they sometimes remit for a long time, but return at certain periods, especially about the solstices. It may likewise be observed, that the raving fits of mad people, which keep the lunar periods, are generally accompanied with epileptick symptoms.

This disease, when it is primary or idiopathick, is worse than the symptomatick, that accompanies the hysterick or hypochondriack passion, which is easily cured; as is that also which succeeds intermitting fevers, a suppression of the menses, of the lochia, of the hæmorrhoids, or which is occasioned by narcoticks. When the paroxysms are slight in the idiopathick kind, the cure is not very difficult; but if it is inveterate, and has but short remissions, it is almost incurable. Sometimes this disease terminates by critical excretions of blood from the nose, uterus, or anus; sometimes diarrhœas and dysenteries will terminate these disorders; and pustules, ulcers, and the itch, have also done the same. As to the cure, bleeding is the most efficacious of all remedies; and where there is a redundance of thick grumous blood, a vein is first to be opened in the foot, a few days after in the arm; then in the jugular vein, or one in the nostrils with a straw; and last of all the frontal vein, with a blunt lancet, for fear of hurting the pericranium. Tepid baths made of rain or river water are also convenient; and before the patient enters the bath, he should have cold water poured on his head. Purgatives are likewise useful; but the lenient are to be preferred to the drastick: thus manna, cassia, rhubarb, cream of tartar, or tartar vitriolate, are most convenient, when the disease arises from the hypochondriack passion, a stagnation of the blood in the intestines, or in the ramifications of the vena portæ, especially when taken in decoctions and infusions at repeated intervals, so as to operate in an alterative manner. Some kinds of mineral waters are also highly efficacious in melancholy madness: but nothing is better for removing the cause of these disorders, than depurated mercury. Particular medicines among vegetables, are balm, betony, vervain, brooklime, sage, worm-wood, flowers of St. John's wort, of the lime-tree, and camphire; from animals, ass's blood; among minerals, steel, cinnabar, sugar of lead, and the calx and tincture of silver. Hoffman is of opinion, that nothing better deserves the name of a specifick in these diseases than motion and exercise, when duly proportioned to the strength of the body. Sedative medicines are good, but not opiates and narcoticks, for these induce stupidity and folly: those that are good in an epilepsy, will be here beneficial, such as castor, shavings of hartshorn, the roots and seeds of piony, antiepileptick powders, the valerian root, flowers of the lily of the valley, and of the lime-tree. Boerhaave says, the principal remedy for raving madness is dipping in the sea, and keeping the patient there as long as he can bear it. As a high degree of the itch has terminated these disorders, it may be proper to make issues in the back; but blisters,

contrary to Shaw's opinion, are prejudicial; for by stimulating the nervous membranes and the dura mater, they increase the spasmodick stricture, and the motion of the gross and bilious blood through the head and the other parts of the body.

As to the diet, the patient should carefully abstain from salt and smoked flesh, whether beef or pork; from shell fish; from fish of a heavy and noxious quality, from aliments prepared with onions and garlick: all which generate a thick blood. He should, in general, eat no more than is sufficient to support nature. Small beer or cold pure water are the best drink; but sweet and strong wines are highly prejudicial, as is also excessive smoaking tobacco. Change of air and travelling may be beneficial.

Madness, proceeding from the bite of a mad dog; see HYDROPHOBIA.

MADREPORA, in botany, a genus of submarine plants, of a stony hardness, but somewhat approaching to the form of other vegetables: it is composed of a main stem, and subdivided into a number of branches, which are full of holes or pores, in a radiated form.

MADRIER, in the military art, a long and broad plank of wood, used for supporting the earth in mining and carrying on a sap, and in making coffers, caponiers, galleries, and for many other uses at a siege. Madriers are also used to cover the mouths of petards, after they are loaded, and are fixed with the petards to the gates or other places designed to be forced open.

MADRIGAL, in the Italian, Spanish and French poetry, is a short amorous poem, composed of a number of free and unequal verses, neither confined to the regularity of a sonnet, nor point of an epigram, but only consisting of some tender and delicate thought, expressed with a beautiful, noble, and elegant simplicity.

MÆMACTERION, μαιμακτηριων, in ancient chronology, the fourth month of the Athenian year, consisting of only 29 days, and answering to the latter part of September and the beginning of October.

MAGAS, in ancient musick, the name of two instruments, the one a stringed kind, and the other a kind of flute, which is said to have yielded very high and very low sounds at the same time.

MAGAS also signifies the bridge of any instrument.

MAGAZINE, a place in which stores are kept of arms, ammunition, provisions, &c. Every fortified town ought to be furnished with a large magazine, which should contain stores of all kinds, sufficient to enable the garrison and inhabitants to hold out a long siege, and in which smiths, carpenters, wheel-wrights, &c. may be employed in making every thing belonging to the artillery, as carriages, waggons, &c.

MAGAZINE *of a Ship of War*, a small store-house in the after or fore part of a ship's hold, where the gunpowder is stowed, and filled into cartridges, bombs, grenadoes, &c. by the gunner and his mates, ready for engagement.

MAGDALEN, or *Nuns of St.* MAGDALEN, an order of religious in the Romish church, dedicated to St. Mary Magdalen, and sometimes called Magdalenettes. These chiefly consist of courtezans, who quitting their profession, devote the rest of their lives to repentance and mortification.

MAGI, or MAGIANS, an ancient religious sect in Persia, and other eastern countries, who maintained that there were two principles, the one the cause of all good, the other the cause of all evil: and abominating the adoration of images, worshipped God only by fire, which they looked upon as the brightest and most glorious symbol of Oromasdes, or the good god; as darkness is the truest symbol of Arimanius, or the evil god. The priests of the magi were the most skilful mathematicians and philosophers of the ages in which they lived, insomuch that a learned man and magian became equivalent terms. The vulgar looked on their knowledge as more than natural, and imagined them inspired by some supernatural power; and hence, those who practised wicked and mischievous arts, taking upon themselves the name of magians, drew on it that ill signification which the word magician now bears among us. This sect still subsists in Persia, under the denomination of Gaurs, where they watch the sacred fire with the greatest care, and never suffer it to be extinguished.

MAGICK originally signified only the knowledge of the more sublime parts of philosophy; but as the magi likewise professed astrology, divination and sorcery, the term magick became odious, being used to signify an unlawful diabolical kind of science, acquired by the assistance of the devil and departed souls.

Natural magick is only the application of natural philosophy to the production of surprizing, but yet natural effects. The common natural magick, found in books, gives us some trifling traditions of the sympathies and antipathies of things, or of their occult and peculiar properties, which are usually intermixed with many childish experiments, admired rather for their disguise than for themselves.

MAGICK *Square*, a square figure formed of a series of numbers in arithmetical progression, disposed into such parallel and equal ranks, as that the sums of each row, as well diagonally as laterally, shall be equal.

MAGISTERY, in chymistry, commonly denotes a white powder, prepared of certain substances by precipitation. These substances are either of the mineral kind, as earth, stones, &c. or vegetables, as herbs, resins, &c. or animals, as bones, horns, and crustaceous parts. The method of preparing it is thus: take the substance from which you design to prepare the magistery, and bruise or break it grossly; then pour thereon a proper liquor, an acid, &c. in order to its solution or extraction. The solution is precipitated by an effusion of the liquor, or by the matter by whose force that of the solvent is blunted; the precipitated powder may be washed, if necessary, with common water, and afterwards gently dried.

MAGISTERY *of Bismuth*, is made by dissolving bismuth in spirit of nitre, and pouring on it salt water, which precipitates the magistery to the bottom.

MAGISTERY *of Lead* is made by dissolving saccharum saturni in distilled vinegar, and then precipitating it with oil of tartar per deliquium.

MAGISTERY *of Resins*, or resinous extracts of scammony, jalap, &c. are made by dissolving the matter in spirit of wine, and precipitating it with water. Mr. Boyle takes magistery to consist in a preparation of a body, whereby it is converted, by means of some additament, into a body of a different kind, as when iron or copper is turned into crystals of Mars and Venus.

MAGISTRATE, any publick officer to whom the executive power of the law is committed, either wholly or in part.

MAGNA CHARTA, the great charter of the liberties of England, and the basis of our laws and privileges. This charter may be said to derive its origin from king Edward the confessor, who granted several privileges to the church and state by charter: these liberties and privileges were also granted and confirmed by king Henry I. by a celebrated great charter, now lost; but which was confirmed or re-enacted by king Henry II. and John. Henry III. the successor of this last prince, after having caused twelve men to make enquiry into the liberties of England in the reign of Henry I. granted a new charter, which was the same as the present magna charta; this he several times confirmed, and as often broke; till in the 37 year of his reign, he went to Westminster-hall, and there, in the presence of the nobility and bishops, who had lighted candles in their hands, magna charta was read, the king all the while holding his hand to his breast, and at last solemnly swearing faithfully and inviolably to observe all the things therein contained, &c. then the bishops extinguishing the candles, and throwing them on the ground, they all cried out, "Thus let him be extinguished, and stink in hell, who violates this charter." It is observed, notwithstanding the solemnity of this confirmation, king Henry, the very next year, again invaded the rights of his people, till the barons entered into a war against him, when, after various success, he confirmed this charter, and the charter of the forest, in the 52 year of his reign. This excellent charter, so equitable and beneficial to the subject, is the most ancient written law in the kingdom: by 25 Edw. I. it is ordained, that it shall be taken as the common law; and by 43 Edw. III. all statutes made against it are declared to be void.

MAGNESIA, or MANGANESE, in natural history. See the article MANGANESE.

MAGNESIA ALBA, in the materia medica, a fine white

white earth, soluble readily in all acids, the vitriolick as well as the others, into a bitter purgative liquor; and not convertible by fire into quick lime.

This earth has not hitherto been found naturally pure or in a separate state: it was for several years a celebrated secret in the hands of some particular persons abroad, till its preparation was made publick by Lancisi in the year 1717, and afterwards by Hoffman in 1722. It was then extracted from the mother-ley, or the liquor which remains after the crystallization, of rough nitre, either by precipitation with a solution of alkaline salt; or by evaporating the liquor, and calcining the dry residuum, so as to dissipate the acids, by which the earth had been made dissoluble.

The magnesia is recommended by Hoffman as an useful antacid, a safe and inoffensive laxative in doses of a dram or two, and a diaphoretick and diuretick, when given in smaller doses, as 15 or 20 grains. Since this time, it has of late come into great esteem among us, particularly in heart-burns, and for preventing or removing the many disorders which children are thrown into from a redundance of acid humours in the first passages. It is preferred, on account of its laxative quality, to the testaceous and other absorbent earths, which, unless gentle purgatives are given occasionally to carry them off, are apt to lodge in the body, and occasion a costiveness very detrimental to infants. It must be observed, however, that it is not the magnesia itself which proves laxative, but the saline compound resulting from its coalition with acids: if there are no acid juices in the stomach to dissolve it, it has no sensible operation, and in such cases it may be rendered purgative by drinking any kind of acidulous liquors after it. All the other known soluble earths yield with acids, not purgative, but more or less astringent compounds.

MAGNET, *Magnes*, loadstone, in natural history, a very rich iron ore, found in large detached masses, of a dusky iron grey, often tinged with brownish or redish, and when broken appearing something like the common emery, but less sparkling. It is very heavy, considerably hard, of a perfectly irregular and uneven surface, and of a firm structure, but usually with some porous irregularities within. It is found in England, and all other places where there are iron mines.

The word is derived from a city in Lydia, called Magnesia, where this stone was first found.

This famous stone was well known to the ancients, but scarce any other property of it than of its attracting iron, as we may see in Pliny, b. 36. c. 16. However, it appears, that they knew something of its communicating virtue, particularly Plato, when describing that famous chain of iron rings put together, the first of which was held by a magnet; and Lucretius makes mention of the same magnetick quality operating through the hardest bodies. But we do not see by any passage in their writings, that they knew any thing of the directive virtue of the loadstone: and we are utterly in the dark as to the time this discovery was first made, as also when it was applied to the use of navigation. It, however, appears, that this discovery was made before the year 1180.

The primary properties of the loadstone are the following: 1. Every loadstone has two points, called poles, which emit the magnetick virtue. 2. One of these poles attracts, the other repels iron, but no other body. 3. This virtue, being the third species of attraction, is communicated to iron very copiously by the touch, which renders it strongly magnetick. 4. A piece of iron so touched by the loadstone, and nicely suspended on a sharp point, will be determined to settle itself in a direction nearly north and south. 5. The end of the needle touched by the south pole of the stone, will point northwards; and the contrary. 6. Needles touched by the stone, will dip below the horizon, or be directed on the touched part to a point within the earth's surface: this is called the dipping needle. 7. This virtue may also be communicated to iron by a strong attrition all one way. 8. Iron rods or bars acquire a magnetick virtue by standing long in one position. 9. Fire totally destroys this virtue, by making the stone or iron red hot. 10. This power is exerted sensibly to the distance of several feet. 11. It is sensibly continued through the substance of several contiguous bodies or pieces of iron. 12. It pervades the pores of the hardest body. And, 13. equally attracts the iron in vacuo as in open air. These and many more are the properties of a body, not more wonderful than useful to mankind.

The cause of the variation of the needle has remained hitherto without any demonstrative discovery; yet since its declination, and inclination, or dipping, do both of them manifestly indicate the cause to be somewhere in the earth, it has given occasion to philosophy to frame hypotheses for a solution, which makes the earth a large or general magnet or loadstone, of which all the less ones are but so many parts or fragments, and being possessed of the same virtue, will, when left to move freely, have the same disposition and similarity of position, and other circumstances.

The most considerable of these hypotheses is that of the late sagacious Dr. Halley, which is this: the globe of the earth is one great magnet, having four magnetical poles or points of attraction, near each pole of the equator two; and that in those parts of the world which lie near adjacent to any one of those magnetical poles, the needle is chiefly governed thereby, the nearest pole being always predominant over the more remote one. Of the north poles, that which is nearest to us he supposes to be in the meridian of the land's end, which governs the variations in European Tartary and the North Sea; the other he places in a meridian passing through California, about 15 degrees from the north pole of the world, which governs the needle in North America, and the ocean on either side. In like manner he accounts for the variations in the southern hemisphere.

The variation of the needle from the north and south points of the horizon not being the same, but variable in different years, and in a diverse manner, in different parts of the earth, made the doctor further conjecture, that two of the magnetick poles were fixed, and two moveable; and in order to make this out, he supposes the external part of the earth to be a shell or cortex, containing within it a magnetick moveable nucleus of a globular form, whose centre of gravity is the same with that of the earth, and moveable about the same axis. Now, if the motions of both the shell and nucleus were the same, the poles of each would always have the same position to each other; but he supposes the motion of the nucleus to be a very small matter less than that of the shell, which yet is scarce sensible in 365 revolutions; and, if so, the magnetick poles of the nucleus will by slow degrees change their distance from the magnetick poles of the shell, and thus cause a variation in that needle's variation, which is governed by the moveable pole of the nucleus, while that variation which respects the fixed poles of the magnetick shell remains more constant; as in Hudson's-bay the change is not observed to be near so fast as in these parts of Europe.

The variation of the needle has, within a century past, undergone a remarkable alteration; for at London it was observed by Mr. Burrows, in the year 1580, to be 11° 15′ east: after that, in the year 1622, it was observed by Mr. Gunter to be but 6° east. In the year 1634, Mr. Gellibrand observed it to be 4° 5′ east. In 1657, it was observed by Mr. Bond to be nothing at all, that is, the needle pointed directly to the north. After this, in the year 1672, Dr. Halley observed it to be 2° 30′ westward; and again, in the year 1692, he found it 6° west. Since then, in the year 1722, Mr. Graham, by most accurate experiments, found it to be 14° 13′, and at present it is between 19 and 20°; and in some places it has been found to be 23° westward.

The ingenious Muschenbroek has, with indefatigable pains and application, made experiments of the attractions and repulsions of loadstones in respect to iron and to each other, but could never find any regular proportion in the increase of attraction in their approach to, or decrease of attraction in their recess from, one another; only that the force of the magnetick virtue did increase in the approach to, and diminish in the recess from, the stone, but not exactly as the distance, nor as the square or cube of the distance reciprocally, nor in any proportion reducible to numbers; and therefore he very reasonably conjectures, that the repulsions and attractions disturb one another, so as to confound the proportion; nor are we able to hope for any other rule concerning this matter, till a way be found, if ever it can be, of separating the attracting from the repelling parts.

The poles of a loadſtone are not to be looked upon as two ſuch invariable points as never to change place; for according to Mr. Boyle, the poles of a little bit of magnet may be changed by applying them to the more vigorous poles of another, as has been confirmed by Dr. Knight, who can change at pleaſure the poles of a natural magnet, by means of iron bars magnetically impregnated. Upon gently cutting a magnet through the middle of its axis, each piece becomes a compleat magnet; for the parts that were contiguous under the equator before the magnet was cut, become poles, and even poles of different names; ſo that each piece may become equally a north or ſouth pole, according as the ſection was made nearer the ſouth or north pole of the large magnet; and the ſame thing would happen in any other ſub-diviſions. But upon cutting a magnet longitudinally, there will then be four poles, the ſame as before the cutting; only that there ſhall be formed in each piece a new axis parallel to the former, and more or leſs in the inſide of the magnet. We find by experience, that two magnets attract each other by the poles of different denominations; whereas, on the contrary, the two ſimilar poles repel each other.

By a great number of experiments we alſo learn that the force of a magnet in attraction and repulſion reaches ſometimes further, ſometimes not ſo far. The activity of ſome reaches to fourteen feet, and that of others is inſenſible within eight or nine inches; the ſphere of activity is greater on certain days than on others, without its ever appearing that the heat, moiſture, or drought of the air contribute any thing to this effect. No ſolid or fluid body can any way hinder the mutual action of iron and a magnet upon each other, unleſs it be iron itſelf: nor does the exceſſive heat of iron diminiſh theſe effects, though the exceſſive heat of a magnet diminiſhes its virtue, at leaſt for a time. The attraction of a magnet newly dug out of a mine, makes it to take up only very ſmall pieces of iron; for which reaſon it muſt be armed in order to augment its force: beſides this, the arming it unites, directs, and condenſes its virtue towards its poles, and cauſes its emanations to tend entirely towards the maſs which is laid thereon. When you have determined where the poles are, which you may exactly find by placing over the magnet a very fine ſhort needle, which will ſtand perpendicular over each pole, and no where elſe; then you muſt file it very ſmooth at its poles, ſo that the axis ſhall have the greateſt length, yet without too much diminiſhing its other dimenſions.

To determine the proportions of the armour, the greater the force of the magnet is, the thicker muſt the pieces of ſteel be of which it is to conſiſt; and for this purpoſe try the magnet with ſeveral ſteel-bars, and the greater weight it takes up with a ſteel-bar on, that bar is to be its armour. Though the attraction of an armed magnet appears conſiderable, yet very weak cauſes deſtroy its effect in a moment; for inſtance, when an oblong piece of iron is attracted under the pole of an excellent magnet, and the pole of a different denomination in another magnet that is weaker, is preſented to the lower end of this piece of iron, this weaker magnet will very ſtrongly take away the iron. In like manner, if the point of a needle be put under one of the poles of a magnet ſo as to hang by its head, and preſent to this head any bar of iron by its upper end, the needle will immediately quit the magnet, in order to adhere to the bar; but if the needle hold by its head to the pole of the magnet, then neither the bar of iron nor a weak magnet ſhall diſengage it; and there is another ſlight circumſtance which makes an armed and vigorous loadſtone appear to have no more force, and that is the too great length of the iron which is to be raiſed by one of the poles.

In order to communicate the magnetick virtue effectually, theſe methods are made uſe of: 1. It has been diſcovered that iron rubbed upon one of the poles of the magnet, acquires a great deal more virtue than from any other part thereof, and this is more conſiderable from an armed than a naked magnet. 2. The more gently the iron is preſſed, and the more it is preſſed againſt the pole, the more magnetical it becomes. 3. It is more convenient to impregnate iron on one pole than on both ſucceſſively. 4. The iron is much better impregnated by preſſing it uniformly, and in the ſame direction, according to its length, than by rubbing it by the middle; and the extremity which touches the pole laſt, retains the moſt virtue. 5. A piece of poliſhed ſteel, or a bit of pointed iron, receives more virtue than a ſimple piece of iron of the ſame figure; and, cæteris paribus, a piece of iron that is long, ſmall and pointed, is more ſtrongly impregnated than that of any other form.

The communication of the magnetick virtue does not ſenſibly impair that of the loadſtone; though it has been obſerved that ſome magnets have communicated a greater power to iron to raiſe weights, than they had themſelves, but without impairing their own force, or adding any thing to the weight of the iron. As ſeveral ways have been propoſed for recovering the decayed virtue of loadſtones, but to little purpoſe, eſpecially that of keeping the ſtone conſtantly in ſteel filings, we ſhall here relate the remarkable experiment of Mr. Haac for this purpoſe, as it was attended with great ſucceſs. This gentleman had a magnet weighing 14 oz. and a half, armed, which would take up 16 times its own weight; but having laid it by for ſome years unuſed, it loſt a $\frac{1}{4}$ part of its virtue, or more; whereupon he hung as much weight to the ſtone as it would ſuſtain, and ſo left it for ſome weeks; then returning, he applied more weight to the former, which it very eaſily bore, and then repeating the addition of more weight at ſeveral periods, in the ſpace of about 2 years, he found that the ſtone had not only recovered its former ſtrength, but increaſed it ſo far, that it would now take up more than 20lb. whereas at firſt it would not take up 15lb.

Artificial Magnets, are ſteel bars impregnated with the virtues of the magnet, ſo that they poſſeſs all the properties, and may be uſed inſtead of the natural loadſtone. There have been ſeveral methods propoſed for making artificial magnets; but none are equal to the following, which is the invention of the ingenious Mr. Canton, a gentleman well known to the learned world, and whom this diſcovery alone will render immortal:

Procure a dozen bars; ſix of ſoft ſteel, each 3 inches long, a $\frac{1}{4}$ of an inch broad, and a $\frac{1}{20}$ of an inch thick, with two pieces of iron, each half the length of one of the bars, but of the ſame breadth and thickneſs; and ſix of hard ſteel, each $5\frac{1}{2}$ inches long, half an inch broad, and $\frac{3}{20}$ of an inch thick, with two pieces of iron of half the length, but the ſame breadth and thickneſs as one of the hard bars: and let all the bars be marked with a line quite round them at one end.

Then take an iron poker and tongs (*plate* LII. *fig.* 1.) the larger they are, and the longer they have been uſed, the better; and fixing the poker upright between the knees, hold to it near the top one of the ſoft bars, having its marked end downward, by a piece of ſewing ſilk, which muſt be pulled tight with the left hand, that the bar may not ſlide: then graſping the tongs with the right hand a little below the middle, and holding them nearly in a vertical poſition, let the bar be ſtroked, by the lower end, from the bottom to the top, about ten times on each ſide, which will give it a magnetick power ſufficient to lift a ſmall key at the marked end: which end, if the bar was ſuſpended on a point, would turn toward the north, and is therefore called the north pole, and the unmarked end is, for the ſame reaſon, called the ſouth pole of the bar.

Four of the ſoft bars being impregnated after this manner, lay the other two (*fig.* 2.) parallel to each other, at the diſtance of about a $\frac{1}{4}$ of an inch, between the two pieces of iron belonging to them, a north and a ſouth pole againſt each piece of iron: then take two of the four bars already made magnetical, and place them together, ſo as to make a double bar in thickneſs, the north pole of one even with the ſouth pole of the other; and the remaining two being put to theſe in ſuch a manner as to have two north and two ſouth poles together, ſeparate the north from the ſouth poles at one end by a large pin, and place them perpendicularly with that end downward, on the middle of one of the parallel bars, the two north poles towards its ſouth, and the two ſouth poles towards its north end: ſlide them backward and forward three or four times the whole length of the bar, and removing them from the middle of this, place them on the middle of the other bar as before directed, and go over that in the ſame manner; then turn both the bars the other ſide upward, and repeat the former operation: this being done, take the two from between the pieces of iron, and

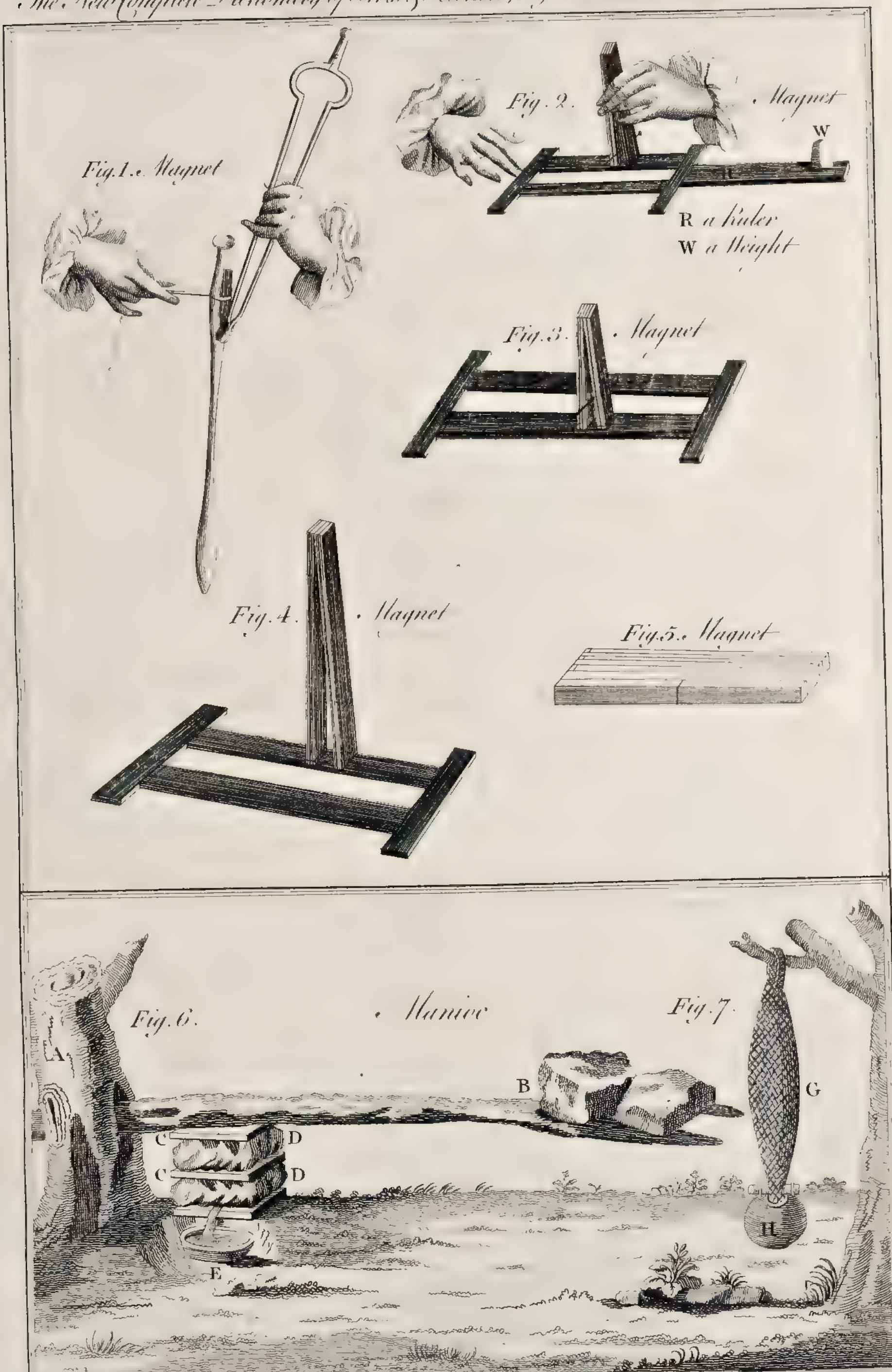

Plate LII.

facing Magnet.

and placing the two outermoſt of the touching bars in their room, let the other two be the outermoſt of the four to touch theſe with: and this proceſs being repeated till each pair of bars have been touched three or four times over, which will give them a conſiderable magnetick power; put the half dozen together after the manner of the four (*fig.* 3.) and touch with them two pair of the hard bars, place between their irons at the diſtance of about half an inch from each other: then lay the ſoft bars aſide; and with the four hard ones let the other two be impregnated (*fig.* 4.) holding the touching bars apart at the lower end near two tenths of an inch, to which diſtance let them be ſeparated, after they are ſet on the parallel bar, and brought together again, before they are taken off: this being obſerved, proceed according to the method deſcribed above, till each pair have been touched two or three times over. But as this vertical way of touching a bar will not give it quite ſo much of the magnetick virtue as it will receive, let each pair be now touched once or twice over, in their parallel poſition between the irons (*plate* LIII. *fig.* 1.) with two of the bars held horizontally, or nearly ſo, by drawing at the ſame time the north of one from the middle over the ſouth end, and the ſouth of the other from the middle over the north end of a parallel bar; then, bringing them to the middle again without touching the parallel bar, give three or four of theſe horizontal ſtrokes to each ſide.

The horizontal touch, after the vertical, will make the bars as ſtrong as they can poſſibly be made: as appears by their not receiving any additional ſtrength, when the vertical touch is given by a greater number, and the horizontal by bars of a ſuperior magnetick power. This whole proceſs may be gone through in about half an hour, and each of the larger bars, if well hardened, may be made to lift 28 troy ounces, and ſometimes more. And when theſe bars are thus impregnated, they will give to an hard bar, of the ſame ſize, its full virtue in leſs than two minutes: and therefore will anſwer all the purpoſes of magnetiſm, in navigation and experimental philoſophy, much better than the loadſtone, which is well known not to have ſufficient power to impregnate hard bars. The half dozen being put into a caſe (*plate* LII. *fig.* 5.) in ſuch a manner, as that two poles of the ſame denomination may not be together, and their irons with them as one bar, they will retain the virtue they have received; but if their power ſhould, by making experiments, be ever ſo far impaired, it may be reſtored without any foreign aſſiſtance in a few minutes. And if, out of curioſity, a much larger ſet of bars ſhould be required, theſe will communicate to them a ſufficient power to proceed with, and they may in a ſhort time, by the ſame method, be brought to their full ſtrength. The ſmith's manner of hardening ſteel is as follows: having cut a ſufficient quantity of the leather of old ſhoes into very ſmall pieces, he provides an iron pan, a little exceeding the length of a bar, wide enough to lay two ſide by ſide without touching each other or the pan, and at leaſt an inch deep. This pan he nearly half fills with the bits of leather, upon which he lays the two bars, having faſtened to the end of each a ſmall wire to take them out by: he then quite fills the pan with the leather, and places it on a gentle flat fire, covering and ſurrounding it with charcoal. The pan being brought to ſomewhat more than a red heat, he keeps it ſo about half an hour, and then ſuddenly quenches the bars in a large quantity of cold water.

This ingenious gentleman reverts the poles of a natural loadſtone by placing it in an inverted direction, between the contrary poles of two of his larger bars, laid down at ſome diſtance from each other, in the ſame ſtraight line continued; without touching the ſtone with either of the bars, and only by placing it, in the manner juſt mentioned, between their poles, at the diſtance of about a quarter of an inch from either of them.

MAGNETICAL, ſomething relating to the magnet, or loadſtone.

Magnetical *Amplitude*, is an arch of the horizon intercepted between the centre of the ſun at his riſing or ſetting, and the eaſt or weſt points of the compaſs: or it is the different riſing or ſetting of the ſun from the eaſt or weſt points of the compaſs.

Magnetical *Azimuth*, is an arch of the horizon, comprehended between the ſun's azimuth circle and the magnetical meridian; or it is the diſtance of the ſun from the north or ſouth point of the compaſs.

MAGNETISM, the virtue or power that the magnet has of attracting iron. For the primary properties of magnetiſm, ſee Magnet.

To which we ſhall add, that the ſame pole of the loadſtone will communicate to a piece of iron the power of attracting or repelling the ſame end of a touched needle, by drawing it different ways thereon: or thus, if a piece of iron be drawn to the right hand and attracts, it will repel if drawn to the left, which is not a little wonderful.

By a ſmart ſtroke of a hammer on the untouched end of the dipping needle, the magnetick virtue may be cauſed to come all to that end from the other, ſo as to make it dip on that ſide, as much as it did on the other ſide before: and, on the contrary, by ſuch a ſtroke, ſometimes, it may be made to dip much more on the touched end than before. Again, ſometimes by ſtriking it, the needle which dipped before, will be reſtored to its equilibrium, as if the virtue had made its eſcape, or were uniformly diffuſed over all the needle. So capricious are the phænomena of this amazing power.

MAGNIFYING, in philoſophy, is applied to microſcopes that make objects appear bigger than to the naked eye; which is done by the ſhewing them nearer, and by that means more of the parts than before were taken notice of.

Magnifying *Glaſs*, in opticks, a little convex lens, which, in tranſmitting the rays of light, inflects them ſo, as that the parallel ones converge, and thoſe which diverge become parallel; whereby objects, viewed through them, appear larger than to the naked eye. See Lens.

MAGNITUDE, or Quantity, any thing locally continued, or that has ſeveral dimenſions. Its origin is a point, which, though void of parts, yet its flux forms a line, the flux of that a ſurface, and of that a body, &c. See Fluxions.

Literal Magnitude, a magnitude expreſſed by letters.

Numerical Magnitude, that expreſſed by numbers.

Broken Magnitude, a fraction, or broken quantity.

Complex Magnitude, that formed by multiplication.

Incommenſurable Magnitude, that which has no proportion to unity.

Apparent Magnitude *of a Body*, in opticks, that meaſured by the optick or viſual angle, intercepted between rays drawn from its extremes to the centre of the eye. So that whatever things are ſeen under the ſame, or equal angles, appear equal; & è contra. See the article Apparent.

The apparent magnitudes of the ſun and moon, at riſing and ſetting, is a phænomenon that has extremely embarraſſed the modern philoſophers. According to the ordinary laws of viſion, they ſhould appear the leaſt, when neareſt the horizon, as being then fartheſt diſtant from the eye; and yet we find the contrary true in fact. F. Gouye advances the following conjecture, that when the luminaries are in the horizon, the neighbourhood of the earth, and the groſs vapours with which they are inveloped, have the ſame effect with regard to us, as a wall, &c. placed behind a column, which in that caſe appears bigger than when encompaſſed on all ſides with an illuminated air.

MAGOPHONIA, in antiquity, a feaſt among the Perſians, in memory of the expulſion of the magi.

MAHOMETANISM, or Mahometism, the ſyſtem of religion broached by Mahomet, and ſtill adhered to by his followers, who are the Turks, Perſians, ſeveral nations among the Africans, and among the E. Indians. See Alcoran.

The chief articles of the Mahometan creed are, that there is no other god but God, and that Mahomet was ſent from God. To theſe articles the Mahometans have added that of bathing, and prayer; which laſt they perform five times a day: they believe, with the Jews and Chriſtians, a reſurrection of the dead.

MAIDEN, an edged inſtrument uſed at Edinburgh formerly, for beheading criminals.

MAIDENHAIR, *Adianthum*, in botany, is one of the claſs of the cryptogamia of Linnæus, and of that of the herbæ epiphylloſpermæ of Mr. Ray. It is a large genus of plants, comprehending a great number of ſpecies,

cies, moſt of which have at one time or other, been recommended as medicines of great power; at preſent, however, there are only three of the ſpecies known in the ſhops, and theſe indeed but little uſed; theſe are, 1. The true maidenhair. 2. The large white maidenhair; and, 3. The little white maidenhair, or wall-rue.

They all attenuate viſcid and tough humours, and at the ſame time obtund the two acrid ones, and have an after aſtringency, by which they reſtore the fibres to their true tone. They are good againſt crudities of the ſtomach, and againſt diarrhœas, and other complaints ariſing from that cauſe: they are good alſo in all diſorders of the breaſt occaſioned by a viſcid phlegm, and in all obſtructions of the viſcera. They are never truſted ſingly, however, in any of theſe caſes, but make a good ingredient among other decoctions, &c. intended to do ſervice in them. They are ſometimes given in a ſlight infuſion, in form of tea, againſt obſtructions of the menſes, when habitual, but not violent. They are ingredients alſo in ſome of the compoſitions of the ſhops. The ſirup of capillare is made from the true adianthum or maidenhair of France, with Narbonne honey; and there i another kind of it brought from America, which is made of an infuſion of the adianthum Americanum, a plant ſomewhat reſembling the true maidenhair, but larger and more branched, and with maple ſugar; a kind of ſugar made from the inſpiſſated juice of the maple, as the common ſugar is in the ſame part of the world from that of the ſugar-cane.

MAJESTY, a title given to kings.

MAIL, or *Coat of* MAIL, a piece of defenſive armour for the body, made of ſmall iron rings, interwoven in the manner of a net.

MAIM, MAIHEM, or MAYHEM, in law, a wound, by which a perſon loſes the uſe of a member that might have been a defence to him.

MAIN, in the ſea language, chief, principal; as the main-maſt, main-yard, main-ſail, main-hatchway, &c.

MAIN alſo implies ſome continent or great land, as oppoſed to iſland: we ſteered between the iſland and the main.

MAINPRISE, in law, is receiving a perſon into friendly cuſtody, who might otherwiſe be committed to priſon, on ſecurity given that he ſhall be forth coming at a certain time and place appointed. There is difference between bail and mainpriſe: for a perſon mainpriſed is ſaid to be at large from the day of his being mainpriſed, till the day of his appearance, and is not liable to be confined by his ſureties: but when a perſon is let to bail by a judge, &c. till a certain day, he is in law always accounted in the ward of his bail during the time, and they may, if they pleaſe, keep him in priſon.

MAINTENANCE, in law, is an unlawful maintaining or ſupporting a ſuit between others, by ſtirring up quarrels, or interfering in a cauſe in which the perſon has no concern.

MAJOR, in military affairs, the name of ſeveral officers, of very different rank and diſtinction.

MAJOR, in logick, the firſt propoſition of a ſyllogiſm. See SYLLOGISM.

MAJOR and MINOR, in muſick, ſignify imperfect concords, which differ from each other by a ſemi-tone minor. See CONCORD.

MAJOR-DOMO, an appellation formerly given to the ſteward or maſter of the king's houſhold.

MAJORANA, marjoram, in botany, a low plant, with ſlender, ſquare, branched, woody ſtalks, and little, oval, ſomewhat downy leaves, ſet in pairs: on the tops grow ſcaly heads of ſmall whitiſh labiated flowers, whoſe upper lip is erect and cloven, the lower divided into three ſegments. It is ſown annually in gardens, for culinary as well as medicinal uſes: the ſeeds, which rarely come to perfection in England, are procured from the ſouth of France, where the plant is ſaid to be indigenous.

This plant has been chiefly recommended in diſorders of the head and nerves, in uterine obſtructions and mucous diſcharges proceeding from what is called a cold cauſe, that is, from a laxity and debility of the ſolids, and a ſluggiſh ſtate of the juices, and in the humoural aſthmas and catarrhs of old people. The powder of the leaves, thin diſtilled water, and the eſſential oil properly diluted, are agreeable errhines, and accounted particularly uſeful in pituitous obſtructions of the noſtrils, and diſorders of the olfactory organs.

MAJORITY, the greater number of perſons.

MAIZE, a ſpecies of grain ſo generally uſed for food in America, that it has obtained the name of Indian corn.

MALACHI, or *the Prophecy of* MALACHI, a canonical book of the Old Teſtament, and the laſt of the 12 leſſer apoſtles. Malachi propheſied about 300 years before Chriſt, reproving the Jews for their wickedneſs after their return from Babylon, charging them with rebellion, ſacrilege, adultery, prophaneneſs, and infidelity, and condemning the prieſts for being ſcandalouſly careleſs in their miniſtry: at the ſame time not forgetting to encourage the pious few, who, in that corrupt age, maintained their integrity. This prophet diſtinctly points at the Meſſiah, who was ſuddenly to come to his temple, and be introduced by Elijah the prophet, that is, by John the Baptiſt, who came in the ſpirit and power of Elias or Elijah.

MALACIA, in medicine, is a languiſhing diſorder incident to pregnant women, in which they long ſometimes for one kind of food, and ſometimes for another, and eat it with an extraordinary greedineſs. When women labouring under this diſorder begin to abſtain from the improper and abſurd things they were fond of, and with leſs reluctance uſe laudable and wholeſome aliments, it is an infallible ſign of a beginning cure and approaching health. Pregnant women are generally freed from the malacia about the fourth month; but if it continues longer it is dangerous becauſe the peccant humours are deeply rooted. For the cure of this diſorder in pregnant women, but few medicines are recommended, for fear of abortion; however, gentle medicines may be uſed for evacuating and corroborating the ſtomach. In young women labouring under a chloroſis, this diſtemper is cured by the ſame medicines that are proper for removing the chloroſis.

MALACOPTERYGIOUS, among ichthyologiſts, an appellation given to one of the five orders of fiſhes, from their having the ray of their fins bony, but not pointed or ſharp at the extremities, like thoſe of acanthopterygious fiſhes.

MALACOSTOMOUS FISHES, thoſe deſtitute of teeth in the jaws, called in Engliſh leather mouthed; as the tench, carp, bream, &c.

MALAGMA, a cataplaſm. See CATAPLASM.

MALANDERS, in farriery, a diſeaſe incident to horſes, proceeding from corrupt blood, hard labour, being over ridden, and ſometimes for want of clean keeping and rubbing. It conſiſts of certain chops or chinks which appear on the inſide of the fore legs, juſt againſt the bending of the knee, which diſcharge a red, ſharp, pungent water. The fureſt method of cure is to waſh the part very clean with urine, or oil of nuts ſhaken with water, and then to mingle equal quantities of linſeed oil and aqua-vitæ, ſtirring and ſhaking them till the mixture grows white, with which anoint the part once a day.

MALE, *Mas*, among zoologiſts, that ſex of animals which has the parts of generation without the body. See ANIMAL and GENERATION.

The term male has alſo, from ſome ſimilitude to that ſex in animals, been applied to ſeveral inanimate things: thus we ſay, a male-flower, a male-ſcrew, &c.

MALEFACTOR, from the Latin *male* and *facio*, an offender againſt law; a criminal *.

MALICE,

* See the MALEFACTOR'S REGISTER; or, the NEW NEWGATE and TYBURN CALENDAR: containing the authentick Lives, Trials, Accounts of Executions, and Dying-ſpeeches, of the moſt notorious VIOLATERS of the LAWS of their COUNTRY; who have ſuffered death, and other exemplary puniſhments, in *England, Scotland* and *Ireland*, from the year 1700 to Lady-day, 1779. Publiſhed in weekly numbers (one or two of which may be had at a time, as may beſt ſuit the reader's convenience) by *Alex. Hogg*, No. 16, Pater-noſter-Row. A work that is executed with great judgment; being exceedingly well calculated both for entertainment and improvement. It is ornamented with a variety of very elegant prints, expreſſive of the moſt intereſting ſcenes in the courſe of the work. But what (in our eſtimation) ſtill renders this work more complete than any other of the kind is, that at the end of every intereſting trial, when the mind is ſuitably prepared, ſuch inferences are drawn, and ſuch moral reflections made, that cannot fail to raiſe in the mind (and eſpecially of young perſons) proper affections. As for example, in vol. 1. p. 168, two men being condemned for murder, and at the place of execution, ſhewed great concern that their bodies were to be hung in chains, the author thus writes,

"What

MALICE, in law, is a premeditated design to do mischief to another. Malice is necessary to constitute the crime of murder. So where a person has a malicious intent to kill, and in the execution of this malicious design kills a third person by accident, he is, on account of his malice, deemed guilty of murder. See MURDER.

MALIGNANT, among physicians, a term applied to diseases of a very dangerous nature, and generally infectious: such are the dysentery, hospital fever, &c. in their worst stages.

MALLEABLE, a property of metals, whereby they are capable of being extended under the hammer.

MALLOW, *Malva*, in botany, a genus of plants, one of the species of which is the common mallow too well known to require a description; it is one of the five emollient herbs, being loosening, cooling, and mollifying: a cataplasm of the leaves of this plant, eases the sting of bees or wasps.

Marsh-MALLOW, *Althæa*. See ALTHÆA.

MALMSEY, a rich kind of wine, so called, as being brought from Malvasia, in the Morea.

MALOPE, in botany, a genus of plants, the flower of which is like that of the common mallow; the fruit is composed of many cells, which are collected in a head, each containing a kidney-shaped seed.

MALPHIGHIA, in botany, a genus of plants, the flower of which is composed of five large, hollow, kidney-shaped petals, with long and linear ungues: the stamina are 10 broad subulated filaments, topped with heart-shaped antheræ: the fruit is a large globose berry, containing osseous, oblong, obtuse, and angulated seeds, each having an oblong and obtuse kernel.

MALT is barley prepared, to fit it for making a potable liquor called beer, or ale, by stopping it short at the beginning of vegetation.

In making malt for barley, the usual method is to steep the grain in a sufficient quantity of water, for two or three days, till it swells, becomes plump, somewhat tender, and tinges the water of a bright brown, or redish colour. Then this water being drained away, the barley is removed from the steeping cistern to the floor, where it is thrown into what is called the wet couch; that is, an even heap, rising to the height of about two feet. In this wet couch, the capital part of the operation is performed; for here the barley spontaneously heats, and begins to grow, shooting out first the radicle, and if suffered to continue, then the plume, spire or blade. But the process is to be stopped short at the eruption of the radicle, otherwise the malt would be spoiled. In order to stop it, they spread the wet couch thin over a large floor, and keep turning it once in four or five hours, for the space of two days, laying it somewhat thicker each time. After this, it is again thrown into a large heap, and there suffered to grow sensibly hot to the hand, as it usually will in 20 or 30 hours time; then being spread again, and cooled, it is thrown upon the kiln, to be dried crisp without scorching.

This is the general process of malting, in which almost every maltster has his secret, or particular way of working. But to render the operation perfect, the following cautions must be observed: 1. That the barley be newly threshed, or at least newly winnowed. 2. That it be not mixed, or made up of different sorts. 3. That it be not over steeped in the cistern, or so long as to make it soft. 4. That it be well drained. 5. That it be carefully looked after in the wet couch, so as to stop the first tendency of the blade to shooting. 6. Another caution is, to turn the wet couch inside outermost, if the barley comes, and shoots more in the middle of the heap than on the sides. 7. To keep it duly turning, after it is out of the wet couch. 8. To give it the proper heating in the dry heap. 9. To dry and crisp it thoroughly upon the kiln, but without a fierce fire, so as to be several days in drying a kiln of pale malt. And if these directions be carefully observed, the malt will always be good.

The method of malting Indian corn or Virginia-wheat, is much less laborious. For if this corn be buried two or three inches deep in the earth, and covered with the loose mould, dug up to make room for it, in ten or twelve days time the corn will sprout and appear like a green field; at which time being taken up, and washed or fanned from its dirt, it is immediately committed to the kiln, and by this means it becomes good malt. It is observable of this corn, that both its root and blade must shoot to a considerable length, before it will make malt; and perhaps this is the case in all large bodied grain.

The importation of malt from beyond the seas is prohibited: and on its being exported, it is not only freed from paying the excise of 6 d. a bushel, but a bounty is allowed by act of parliament, for which see CORN.

Malt-liquors have different names, and different virtues, from the different methods of preparing the malt, whence they are distinguished into pale and brown; and from the various methods taken in brewing the liquors, whence they are divided into ale and beer, strong and small, new and old. See BREWING.

The colour of the liquor, and many of its effects, depend on the manner of drying the malt it is brewed with; that which has the palest tinge, is made with malt but slenderly dried; whereas that which is high coloured, is made with malt that is high dried, or roasted, as it were, in comparison of the other; and amber ale is made of a mixture of both. Another difference in the preparations of malt-liquors consists in the larger quantity of hops in beer, and the smaller in ale; for hops add something of an alkaline nature to the liquor, and not only render it more easy of digestion and secretion in the body, but while it is in the liquor, prevent its running into such cohesions as would make it ropy, vapid, and sour. For this reason Dr. Quincy is of opinion, that for one constitution injured by beer, there are numbers spoiled by ale, which is apt to stuff the vessels with slime and viscidity, to make the body unwieldy and corpulent, and to pave the way for cachexies, the jaundice, asthmas, and the dropsy. The different degrees of strength in malt-liquors also makes them produce different effects. The stronger they are, the more viscid parts they carry into the blood: they are therefore in general the more wholesome for being small: that is, of such a strength as to carry some degree of warmth into the stomach, but not so as to prevent their being proper diluters of our necessary food. Indeed people of robust constitutions, who labour very hard, may dispense with reasonable quantities of the strongest; especially as their food is frequently poor and slender enough, the deficiencies of which this supplies; and their continual exercise and strength of body digests and breaks the viscidities of the drink into convenient nourishment: though in persons of another habit and way of living, they would only produce obstructions and ill humours. As to the age of these liquors, it has somewhat the same effect as hops, for those that are longest kept, are certainly least viscid: for age, by degrees, breaks their viscid parts, and by rendering them smaller, makes them fitter for secretion.

MALT-DISTILLERY, the art of converting malt-liquors into a clear inflammable spirit.

Before the liquor, or what the distillers call wash, is put into the still, it must be properly brewed and fermented; but even then it will be of a mucilaginous or glutinous nature; and there requires a particular management to prevent its scorching, and to make it work kindly. If it should happen to be burnt in the operation, the spirit would acquire a very disagreeable flavour, or empyreuma, which will require a great deal of trouble to remove. In order, therefore, to prevent this disagreeable consequence; the wash must be made dilute; the fire be properly regulated; and the liquor kept in a constant agitation. The constant agitation of the wash in the still may be effected by constantly stirring it with a paddle or oar, till the liquor begins to boil, and then immediately luting on the still-head; by putting some solid and moveable bodies into the still; or by placing

" What is the inference to be drawn from this fact? It seems evident that such is the corruption of the human heart, that men will
" commit those crimes without blushing, the slightest punishment of which they cannot bear the idea of: for surely the hanging in
" chains, after death, can scarcely be deemed a punishment.—There is no saying to what lengths any man may proceed who once
" departs from the path of integrity. Many a person has been executed for murder, whose first crimes were of a very inferior nature;
" but vice is not only rapid, but greedy in its progress. It is like a snow-ball rolled down a hill; its bulk increases by its own
" swiftness. Hence let the young and the thoughtless be taught to guard against the *first* approaches of vice; to shun the contamina-
" tion of bad company, as they would a pestilence; and, in the scripture phrase, to *fly from all appearance of evil.*"

ſome proper matter at the bottom and ſides, where the fire acts the ſtrongeſt.

1. The uſual method of ſtirring with the paddle is very defective, as being of no uſe after the ſtill is once brought to work; whereas it often burns in the working. This method is greatly improveable by an addition to the ſtructure of the ſtill; whence the agitation may be commodiouſly continued during the whole operation: and this though the waſh were made very thick, or wine-lees themſelves were to be diſtilled. The method is this: ſoldier a ſhort iron or copper-tube in the centre of the ſtill-head: and below, in the ſame head, place a croſs-bar, with a hole in the middle, correſponding to that at-top; through both which, is to run an iron-pipe, deep down into the ſtill; and through this an iron rod: to the bottom whereof wooden ſweeps are to be faſtened; ſo that, this rod being worked at-top, backwards and forwards, with a winch, they may continually rake and clear the bottom plate and adjacent ſides of the ſtill: the interſtices of the tubes being at the ſame time well crammed with tow at-top, to prevent any evaporation thereat.

2. The ſame effect may in good meaſure be ſecured by a leſs laborious way; viz. by placing a parcel of cylindrical ſticks lengthwiſe, ſo as to cover the whole bottom of the ſtill; or elſe by throwing in a parcel of looſe faggot-ſticks at a venture: for thus the action of the fire below, moving the liquor, at the ſame time gives motion to the ſticks, and makes them continually act like a parcel of ſtirrers upon the bottom and ſides of the ſtill, ſo as to prevent the liquor from ſcorching.

3. But a better method ſtill is, upon a parcel of large cylindrical ſticks to lay looſe hay, to a conſiderable thickneſs; ſecuring it from riſing by two aſh-poles laid acroſs, and preſſing hard againſt the ſides of the ſtill; which might, if neceſſary, be furniſhed with buttons or loops, to ſecure the poles from ſtarting. But care muſt here be had, not to preſs the hay againſt the ſides, for that would preſently make it ſcorch; which being otherwiſe defended by the ſticks, it is not apt to do. Theſe are ſimple but effectual contrivances, which, in point of elegance, are eaſily improveable at pleaſure.

There is a farther inconvenience attending the diſtillation of malt-ſpirit, when all the bottoms or groſs mealy feculent ſubſtance is put into the ſtill, along with the waſh: which thus coming to thicken a little, like ſtarch in the boiling, and loſing the thinner liquor, wherewith it was diluted, as the ſtill works off; the mealy maſs at length grows ſo viſcous, as ſometimes to ſcorch towards the end of the operation. To prevent this ill effect, it is very proper to have a pipe, with a ſtop-cock, leading from the upper part of the worm-tub into the ſtill; ſo that, upon half or a quarter turn, it may continually ſupply a little ſtream of hot water, in the ſame proportion as the ſpirit comes off, by which means the operation will be no ways checked or hindred.

But in Holland, where they work their waſh thick, with all the malt and meal along with it, they commonly uſe no art at all to prevent burning; only charge whilſt the ſtill is hot and moiſt, after having been well waſhed and cleanſed. And yet they very rarely ſcorch, unleſs it be now and then in the winter. When ſuch an accident happens, they are extremely ſolicitous to ſcrape, ſcrub, and waſh off the leaſt remains of the burnt parts; by which means they effectually avoid the danger there would otherwiſe be of burning a ſecond time. But moſt effectually to prevent any accident of this kind, there is nothing comparable to the way of working by the balneum mariæ, if the diſtillers could have the addreſs to find their account in it. All ſimple ſpirits may be conſidered in the three different ſtates of low-wines, proof-ſpirit, and alcohol: the intermediate ſtates being of leſs general uſe, and to be judged of according as they approach to or recede from theſe. Low-wines, at a medium, contain a ſixth part of totally inflammable ſpirit; five times as much water as perfect ſpirit naturally riſing in the operation with a boiling heat. Proof-goods contain about half of the ſame totally inflammable ſpirit, and alcohol entirely conſiſts of it.

Malt-low-wines, prepared in the common way, are exceeding nauſeous, fulſome, and diſagreeable. They have however a natural venoſity, or pungent acidity, that would render the ſpirit agreeable, were it not for the

groſs oil of the malt abounding therein. When this oil by ſuitable contrivances, as mentioned before, is kept from running in among the low-wines, they prove conſiderably ſweeter, both to the ſmell and taſte; and leſs thick and milky to the eye. When diſtilled over gently, in order to their rectification into proof-ſpirit, they leave a conſiderable quantity of this groſs fœtid oil behind, with the phlegm, in the ſtill. But, if the fire be made fierce, this oil is again thrown over, mixed with the ſpirit; and, being now broke ſomewhat fine, impregnates it rather in a more nauſeous manner than at firſt. And this is the uſual fault committed not only by the malt-ſtiller, but even the rectifier; who, inſtead of ſeparating and keeping back the foul parts, according to the deſign of the operation, really brings them over in greater vigour. Whence it is not unuſual, after repeated rectifications, as they call them, both ſimple and compound, to find the ſpirit much more nauſeous and diſagreeable than it came from the hands of the malt-ſtiller. The remedy is, plainly, either gentle and ſoft working in the common engine, or the prudent uſe of the balneum mariæ. Malt-low-wine, when brought into proof-ſpirit, appears bright and clear, without the leaſt cloud or milkineſs; no more oil being contained in the mixture than is perfectly diſſolved by the alcohol, weakened with its own quantity of phlegm. Its taſte alſo is much cleaner for the ſame reaſon; viz. becauſe no groſs parts of the oil can, in their own form, hang upon the tongue, but now paſs readily and ſlightly over it: which is not the caſe in low-wines and faints, where the oil remains diſtinct and undiſſolved.

When proof malt-ſpirit is diſtilled over again, in order for alcohol, if the fire be raiſed when the faints begin to come off, a very conſiderable quantity of oil will be brought over, and run in the viſible form of oil, from the noſe of the worm. Though this is not peculiar to malt-ſpirit, but others alſo, and even French brandies do the ſame; ſo that ſometimes half an ounce or more of this oil may be collected from a ſingle piece of brandy. Malt-ſpirit, more than almoſt any other, requires to be brought into the form of alcohol, before it can be uſed intirely; eſpecially, as it is now commonly made up, with as much fulſome oil in it as will give it the ſtrongeſt proof. On which account it is, that in all compound waters, not excepting thoſe of the apothecary, an indifferent judge will eaſily find the predominant flavour of this fulſome ſpirit, through that of all their ingredients. For this reaſon, it ought at leaſt to be rectified, in balneo mariæ, to a perfect alcohol, before it is uſed in the finer compoſitions. And, when once brought, with a due care and art, to a perfect alcohol indeed, it is then preferable to the French brandies for all curious internal uſes; as being a much more uniform, hungry, taſteleſs, and impregnable ſpirit than thoſe uſually are. This alcohol ought to be kept in cloſe earthen vaſes or jars; not only to prevent its evaporation, but alſo its colouring itſelf with the reſinous parts of the oak, which it diſſolves powerfully, when preſerved in caſks.

The quantity of pure alcohol obtainable from a certain quantity of malt differs according to the goodneſs of the ſubject, the manner of the operation, the ſeaſon of the year, and ſkilfulneſs of the workman: according to which variations, a quarter of malt may afford from 8 or 9, to 13 or 14 gallons of alcohol; which ſhould encourage the malt-ſtiller to be careful and intelligent in this buſineſs. As, after each operation in the common way, there is always a remainder of faints, which never ought in their foul ſtate to be mixed among the cleaner ſpirit; they ſhould either be converted to other uſes, or treated in a particular manner, ſo as to make a pure alcohol: the uſes they are otherwiſe fit for being principally external, or, when rediſtilled to a proper height, burning in lamps: for which purpoſe they may have their diſagreeable odour corrected by proper aromaticks, or other ingredients, uſed in diſtillation.

But to make them into pure and perfect alcohol is a work of greater difficulty; yet practicable, though not perhaps to advantage. One way of effecting it is by ſlowly rectifying them from water into water; by which operation ſeveral times repeated, a pure alcohol may be obtained from the fouleſt and moſt oleaginous faints. The œconomical uſe of the ſtill bottoms of the malt-waſh is ſufficiently underſtood by the malt-ſtiller; and,

being

being ſo profitable an article, may, perhaps, render him leſs ſolicitous about the improvement of the other branches of the buſineſs. But theſe bottoms might have ſome further, if not more advantageous uſes than feeding of animals. Thus, in particular, they might, in a chymical way, afford a large proportion of an acid ſpirit, an oil, a fewel, and a fixed ſalt; and, with ſome addreſs and good management, a vinegar or a tartar. Beſides this, one uncommon uſe thereof has been already touched upon, where the refuſe waſh is obſerved, to be very advantageouſly employed, inſtead of water, in the next brewing: as more readily diſpoſing the ſubject to ferment; giving the ſpirit a vinoſity, and ſomewhat increaſing its quantity. But the proportion for this purpoſe ſhould not exceed that of a fifth or ſixth of the whole liquor employed. The liquor left behind in the ſtill, upon rectifying the low-wines, is little more than mere phlegm or water, impregnated with a few acid and ſome oily parts, not worth ſeparating, unleſs for curioſity. And the ſame is to be underſtood of the liquor left behind upon diſtilling proof-ſpirit into it.

Knights of MALTA, otherwiſe called *Hoſpitallers of St. John of Jeruſalem*, a religious military order, whoſe reſidence is in the iſland of Malta. The order conſiſts of three eſtates, the knights, chaplains, and ſervants at arms: there are alſo prieſts who officiate in the churches, friar-ſervants, who aſſiſt at the offices, and donnes or demicroſſes; but theſe are not reckoned conſtituent parts of the body: the government of the order is mixt, being partly monarchial, and partly ariſtocratical: the grand maſter is ſovereign. The knights formerly conſiſted of eight different languages, but now only ſeven, the Engliſh having withdrawn themſelves. None are admitted into this order but ſuch as are of noble birth: the knights are of two ſorts, thoſe who have a right to be candidates for the dignity of grand maſter, called grand croſſes, and thoſe who are only knights aſſiſtants: they never marry, yet have continued from 1090 to the preſent time. The knights are received into this order either by undergoing the trials preſcribed by ſtatutes, or by diſpenſation.

MALTHA, in antiquity, a kind of cement, of which there were two ſorts, native and factitious; one of the latter ſort, much in uſe, conſiſted of pitch, wax, plaſter, and greaſe. Another kind uſed by the Romans in their aqueducts, was made of lime ſlacked in wine, incorporated with melted pitch, and freſh figs. Natural maltha is a kind of bitumen, wherewith the Aſiaticks plaſter their walls; and which being once ſet on fire, water makes it burn more fiercely.

MALVA, in botany, See MALLOW.

MAMALUKES, the name of a dynaſty that reigned in Egypt.

The mamalukes were originally Turkiſh and Circaſſian ſlaves, bought of the Tartars by Melicſaleh, to the number of a thouſand, whom he bred up to arms, and raiſed ſome to the principal offices of the empire. They killed ſultan Moadam, to whom they ſucceeded.

Others ſay, that the mamalukes were ordinarily choſen from among the Chriſtian ſlaves, and that they were the ſame thing in a great meaſure with the janiſſaries among the Turks. They never married; they firſt are ſaid to have been brought from Circaſſia, and ſome have ſuppoſed that they began to reign about the year 869.

MAMMÆ, the BREASTS, in anatomy. See BREAST.

MAMMEA, in botany, a genus of the polyandria monogynia claſs. The corolla conſiſts of four petals, and the calix of two leaves; and the berry is large, and contains four ſeeds. There are two ſpecies, none of them natives of Britain.

MAMMIFORM, in anatomy, a name given to apophyſes of the bone in the back part of the ſcull, ſo called from their reſembling a breaſt.

MAMILLARY, MAMMILLARIS, in anatomy, an epithet given to two little protuberances, ſomewhat reſembling the nipples of the breaſt, found under the four ventricles of the brain, and ſuppoſed to be the organs of ſmelling. Theſe are called apophyſes mammillares. There is alſo a muſcle called mamillaris, or maſtoides, ſerving to ſtoop the head.

MAMMOTH's TEETH, in natural hiſtory, certain large foſſile teeth, found in great plenty in Ruſſia, and ſuppoſed to have belonged to elephants.

MAN, HOMO, is ranked by Linnæus under the order of primates, and characteriſed by having four parallel foreteeth both in the upper and lower jaw, and two mammæ on the breaſt. The ſpecies, according to this author, are two, viz. the homo ſapiens, and the homo troglodytes. He ſubdivides the homo ſapiens into five varieties, viz. the American, the European, the Aſiatick, the African, and what he calls the mònſtrous. The troglodytes, or orang outang, is a native of Æthiopia, Java, and Amboina. His body is white; he walks erect; and is about one half the ordinary human ſize. He generally lives about 25 years. He conceals himſelf in caves during the day, and ſearches for his prey in the night. He is ſaid to be exceedingly ſagacious, but is not endowed with the faculty of ſpeech.

MANAGE, or MENAGE, an academy for learning to ride the great horſe, and where pupils are taught the art of riding. It alſo ſignifies the exerciſe itſelf.

MACHINEEL, hippomane, in botany, a large tree growing naturally in the W. Indian iſlands. The fruit of the machineel tree is very dangerous to eat, cauſing violent inflammations in the mouth and throat; the wood is much eſteemed in America, for making cabinets, book-caſes, &c. being very durable, and taking a fine poliſh; it is alſo ſaid that the worms will not eat it. As the trees abound with milky cauſtick juice, ſo before they are felled, they make fires round their trunks, to burn out their juice, otherwiſe thoſe who fell them would be in danger of loſing their ſight, by the juice flying into their eyes; and wherever this falls on the ſkin, it will raiſe bliſters; if dropt on linen, it immediately turns the part black, and on being waſhed will come in holes. It is alſo dangerous working the wood after it is ſawed out, for if any of the ſaw-duſt happens to get in the workman's eyes, it cauſes inflammations and the loſs of ſight for ſome time; to prevent which, when they are working it, they generally cover their faces with fine lawn.

MANDAMUS, in law, a writ iſſuing out of the King's-bench, ſent by the king to the head of a corporation, commanding them to admit or reſtore a perſon to his office. It was alſo a charge to the ſheriff, to take into the king's hands all the lands and tenements of the king's widow, who, contrary to her oath, married without his conſent.

MANDARINS, the nobles and magiſtrates of the eaſtern countries, eſpecially thoſe of China.

The mandarinate is not hereditary, nor are any raiſed to it but men of letters.

MANDATE, *Mandatum*, in the canon law, denotes a reſcript by which the pope commands ſome ordinary, &c. to put the perſon therein nominated in poſſeſſion of the firſt benefice vacant in his collation.

MANDIBULE, *Mandibula*, *Maxilla*, in anatomy. See JAW.

MANDIBULARES, or MANDUCATORII MASCULI, the ſame with maſſeters. See JAW.

MANDRAKE, *Mandragora*, *Mandragoras*, in botany, one of the principal ingredients in the unguentum populneum. Mandrake is one of the pentandria monogynia of Linnæus, and of the herbæ bacciferæ of Mr. Ray. It is deſcribed by all the botanical writers under the name of mandragora, with the diſtinction into male and female.

MANGANESE, MAGNESIA, in natural hiſtory, a poor kind of iron-ore. Manganeſe is found in great abundance in the German and Swediſh mines, as alſo in France, Italy, and England; but ours is not equal in beauty or goodneſs to the German. It is recommended by authors as an aſtringent, and ordered to be given after calcination in hæmorrhages; but it is very improper for internal uſe. It is of great ſervice, however, to the glaſſmen, in clearing away the greeniſh colour from their white glaſs while in fuſion. See GLASS.

MANGER, in the ſea-language, a ſmall apartment in the fore-part of a ſhip, which is fenced on the after-part by a ſort of bulk-head or barrier; the uſe of which is to prevent the water, which ruſhes in at the hawſe-holes, or the holes through which the cable goes, from running aft on the lower decks, which would render them extremely uncomfortable to the men, who eat and ſleep there. As ſoon as the water enters at the hawſe-holes, which is always the caſe when the ſhip pitches

deep forward, it is conveyed away again through the fide into the fea by feveral fmall pipes or channels, called fcuppers. See SCUPPERS.

MANGO TREE, in botany, the name of a vaft tree, 40 feet in height, and 18 in thicknefs, and fpreads its numerous branches all around at a great diftance, being always green, and bearing fruit once or twice a year, from fix or feven years old to an hundred. It is propagated by incifions, or fowing the feed, in Malabar, Goa, Bengal, Pegu, and many other countries in the E. Indies.

The ftalks fupply the place of arequa or caunga, in the chewing of betel; the fame calcined and reduced to powder, takes away warts. Of the tender leaves, with the bark of the avanacoe, that is, the ricinis, the feed of the cummin and parpadogam, is made a decoction, which is highly beneficial in the cough, afthma, and other affections of the thorax. The bark of the tree pulverifed, and taken in chicken broth, is an excellent diffolvent of extravafated and coagulated blood, occafioned by a fall, in any part of the body. The juice of the bark, with the white of an egg, and a very little opium, taken inwardly, is a prefent remedy againft the diarrhœa, dyfentery, and tenefmus. Of the gum of the tree, and the flowers of rice, with the addition of a fmall quantity of opium and pepper, are prepared pills, which alfo cure all forts of fluxes of the belly. Of the flour of the dried kernels, the natives have the art of preparing various kinds of food.

MANICHEES, in church hiftory, a fect of Chriftian hereticks in the third century, the followers of Manes who made his appearance in the reign of the emperor Probus; pretending to be the comforter, whom our Saviour promifed to fend into the world. He taught that there are two principles, or gods, coeternal and independent on each other, the one the author of all evil, and the other, of all good; a doctrine which he borrowed from the Perfian magi. He held that our fouls were made by the good principle, and our bodies by the evil one, and that the fouls of his followers paffed through the elements to the moon, and from thence to the fun, where being purified, they then went to God, and became united with his effence; but as for the fouls of other men, they either went to hell, or were united to other bodies. He alledged, that Chrift had his refidence in the fun, the Holy Ghoft in the air, Wifdom in the moon, and the Father in the abyfs of light. He is alfo charged with denying the refurrection and condemning marriage; with teaching that Chrift was the ferpent that tempted Eve; with forbidding the ufe of eggs, cheefe, milk and wine, as proceeding from the bad principle; with ufing a different kind of baptifm from that of the church; with teaching that magiftrates were not to be obeyed, and with condemning the moft lawful wars.

MANICORDION, a mufical inftrument, in form of a fpinnet, which confifts of 50 chords and upwards, which are covered with pieces of fcarlet cloth to deaden, as well as foften, the found: whence it is called the dumb fpinnet.

MANIFESTO, a publick declaration in writing made by a prince to fhew the motives that introduced him to any enterprize, and the grounds of his pretenfions.

MANILLE, in commerce, a large brafs ring, like a bracelet, either flat, or round, &c. which the Europeans carry to the coaft of Africa to traffick with the Negroes in exchange for flaves. With thefe the natives deck themfelves, putting them on the fmall of the leg, or thick of the arm above the elbow. The better fort wear gold and filver manilles, of their own manufacture.

MANIOCK, the name of a plant cultivated in many parts of the W. Indies, the root producing what is called the caffa-bread, eaten by the negroes, and often by the natives. Linnæus confiders this plant as a fpecies of the jatropha. This plant rifes with a fhrubby ftalk fix or feven feet high, garnifhed with fmooth leaves, compofed of feven lobes, which are joined at their bafe in the centre, where they are narrow, but increafe from thence in breadth till within an inch and a half of the top, diminifhing thence to an acute point. The flowers are produced in umbels at the tops of the ftalks; the germen turns to a roundifh capfule, with three lobes, each having a diftinct cell containing one fingle feed. The root is confiderably large, and when deprived of its juice, which is faid to be poifonous, the remainder is reduced to a kind of flour, and made into bread.

The negroes commonly make ufe of the following prefs for freeing the root from its juice. A (*plate* LII. *fig.* 6.) is the body of a tree pierced through. B, a lever, made of the forked limb of a tree, and loaded at its extremity by heavy weights. C, C, pieces of board placed between each cake. D, D, the maniock, to render the preffure equal upon every part of it. E, part of a calabafh, placed to receive the juice of the maniock.

The Caribeans take another method; they pound the root and inclofe the pulp in a net G, (*fig.* 7.) This net they fufpend on the branch of a tree, and at the other faften a large weight. H, as the juice flows out, they twift the net, till all the juice is preffed out. This being done, the remainder is well wafhed in clear water, made into a kind of dough, and baked into cakes.

Plate LIII. *fig.* 3. reprefents an indigo manufacture, already defcribed under that article. See INDIGO.

A, a refervoir of clear water. B, the firft vat or ciftern, where the indigo is fermented. C, the fecond vat, or that where the liquor is heated to feparate the indigo. D, a fmall refervoir to receive the liquor from the fecond vat, through the cock F. E, the centre, or pin upon which the beating pole moves. G, the indigo in bafkets drying in the fhade. H, a fhed, where the indigo is finifhed for the market. I, a negro bringing the plant to the firft vat. K, a negro beating the indigo in the fecond vat. L, indigo plants. M, the planter's houfe. N, N, an indigo plantation. (*Fig.* 4.) Q, a well-polifhed filver cup, for examining the colour of the indigo during its fermentation in the battery, or fecond vat. (*Fig.* 5.) P, a crooked knife, for cutting the indigo into pieces. (*Fig.* 6.) O, O, moulds of wood placed upon truffels for drying the indigo in the fhade.

MANIPULATION, denotes the manner of digging the filver, &c. out of the earth. See SILVER.

MANIPULUS, *Manipule*, among the Romans, denoted a body of infantry, that in Romulus's time confifted of 100 men; and in that of the confuls and firft Cæfars of 200. Each manipule had two centurions, called manipularii; the one of which was fubordinate to the other.

MANIPULUS, in phyfick, denotes a handful of flowers, herbs, &c. and is abbreviated in prefcriptions by M.

MANNA, in the materia medica, the concreted juice of fome vegetable, naturally exfudating from it, foluble in water, and not inflammable.

It is a honey-like juice, brought to us from Calabria and Sicily, fometimes in fmall granules, or drops of an irregular figure, roundifh, oblong, crooked, and fometimes contorted. It fhould be chofen whitifh, or at the utmoft with only a faint caft of yellow, not too heavy, in regular dry granules, or in moderately long ftriæ or flakes, of a pleafant tafte, and diffolving wholly in the mouth, not leaving a farinacious fubftance behind it, as much of the common manna does that has been adulterated with honey and floor.

Manna is the mildeft and fafeft of all purges, and may be given to children, to women with child, and to people of the moft tender conftitutions, with perfect fafety; and it never fails gently to move the bowels.

MANNA, is alfo a fcripture term, fignifying a miraculous kind of food, which fell from heaven for the fupport of the Ifraelites in their paffage through the wildernefs: being in the form of coriander feeds; its colour like that of bdellium, and its tafte like honey.

The Hebrews who had been acquainted with the manna of the Alhagi, which was round and like coriander feed, and fweet to the tafte, and which they call man, (as we find in the earlieft works in which it is mentioned in that language) when they found a miraculous food in the defert, and which was alfo round, fweet, and of the bignefs of coriander feed, did not fcruple to call it man or manna, as it fo much refembled that fubftance: their exclamation man hu, on the feeing it, not being meant to exprefs, as is vulgarly fuppofed, what is this? but this is man or manna. This was a conjucture the more natural to them, as they faw plainly enough that this defcended from the heavens in form of a dew and concreted into the globules they faw it in; and the received opinion of that time was, that the oriental manna was formed in the fame manner, none fuppofing in thofe early


Fig. 2. Mantelets
Fig. 1 Magnet
Fig. 3. Manioc
A
N
N
N
B
I
E
C
E
D
K
H
G
L
Fig. 6.
O
O
Fig. 5. P
Fig. 4. Q

early times that it was the natural juice of the ſhrub it was found upon, but every body imagining it was due from the clouds concreted on the plant.

Moſes did not determine the queſtion for them, whether it was or was not a kind of manna; all that he had to do was to tell them, that it was ſent for their ſupport, and to inſtruct them in what manner they were to gather it. It is however evident that this was not manna, nor any thing of that nature, becauſe it melted away, as the ſun grew hot, whereas the manna hardens inſtead of diſſolving in that heat.

MANNER, in painting, &c. that peculiar character obſervable in the works of painters, poets, &c. by which their pencil or ſtyle are diſtinguiſhed. It alſo denotes the invention, deſign, and colouring.

MANNERS, in poetry, denote the inclinations, genius, and humour which the poet gives his perſonages, whereby their characters are diſtinguiſhed.

The manners ſhould have four qualities; they ſhould be good, like, ſuitable, and equal. The manners are good, when the diſcourſe of the perſons makes us clearly ſee their inclinations, and what good or evil reſolutions they will take.

Likeneſs of manners only relates to publick perſons, whoſe characters are well known in hiſtory, with which the poetick characters muſt agree. The manners muſt alſo be ſuitable, that is, agreeable to the age, ſex, rank, &c. of the perſon that has them; again they muſt be equal, that is, conſiſtent through the whole character: the fearful muſt never be brave: nor the brave timorous, &c. In this reſpect Shakeſpeare's manners are admirable.

Beſides the aforeſaid qualities, the manners muſt be neceſſary; that is, no vicious quality muſt be given a poetick perſonage, unleſs it be abſolutely neceſſary, or requiſite for carrying on the action.

MANOMETER, or MANOSCOPE, an inſtrument whereby to meaſure the alterations in rarity or denſity of the air. It differs from the barometer, in that the latter only meaſures the weight of the atmoſphere, or column of air over it.

MANOR, MANNOR, an ancient lordſhip, royalty, and juriſdiction conſiſting of demeſnes and ſervices, and of a court-baron. A manor may conſiſt of a houſe, arable land, paſture, meadow, wood, rent, advowſon, court-baron, &c. and this ought to be beyond the memory of man.

MANSE, denotes a dwelling-houſe, either with or without land. It alſo denotes a parſonage or vicarage-houſe, particularly in Scotland, wherein the miniſter of a pariſh reſides: being an eſſential part of the endowment of a kirk with the ſtipend, glebe, and tythes, &c.

MANSLAUGHTER, generally termed homicide, is killing a perſon without premeditated malice.

Manſlaughter differs from murder, in its not being committed from the dictates of a former malicious intention; and from chance medley, in its being done with a preſent intention to kill. Thus, where two perſons, who before meant no harm to each other, meet and quarrel, and in the heat of paſſion one kills the other; in this caſe he is guilty of manſlaughter. If two perſons fall out and fight, and the one breaks the other's ſword, on which a ſtander-by lends him another, with which the adverſary is killed, it is manſlaughter both in the ſlayer and ſtander-by. And where a man is taken in adultery with another perſon's wife, and the huſband immediately draws and kills him, it is only manſlaughter, the huſband having had a juſt provocation for ſo doing: but where any other perſon ſtabs another, who has not a weapon drawn, or ſtruck firſt, ſo that the perſon ſtabbed dies within ſix months, notwithſtanding there was not malice aforethought, it is felony without benefit of clergy. In other caſes, though manſlaughter is accounted felony, yet for the firſt offence the offender is allowed the benefit of clergy.

MANTLETS, in the art of war, a kind of moveable parapets, made of planks about three inches thick, nailed one over another, to the height of almoſt ſix feet, generally caſed with tin, and ſet upon little wheels, ſo that in a ſiege, they may be driven before the pioneers, and ſerve as blinds to ſhelter them from the enemy's ſmall ſhot. There are other parts of mantlets, covered at the top, and uſed by miners in approaching the walls of a town or caſtle.

MANTLE, or MANTLE-TREE, in architecture, the lower part of the chimney, or that piece of timber which is laid acroſs the jaumbs, and ſuſtains the compartment of the chimney-piece. See CHIMNEY.

MANTLE, or MANTLING, in heraldry, that appearance of folding of cloth, flouriſhing or drapery, that is in any atchievement drawn about the coat of arms. It is ſuppoſed originally to be the repreſentation of a mantle, or military habit, worn by the ancient cavaliers over their armour to prevent it from ruſt; or, as others hold, a ſhort covering only worn over the helmet, which in aftertimes was lengthened, and made to hang from the helmet below the whole ſhield.

The mantle is always ſaid in blazonry, to be doubled, that is, lined throughout with one of the furs, as ermin, pean, viary, &c.

MANUFACTURER, one who works up a natural product into an artificial commodity.

MANURE, in agriculture and gardening, any thing that is uſed to enrich, fatten, and improve land.

There are various kinds of manure proper for the different kinds of land we meet with: if the land is looſe and ſandy, the mud out of ponds, or ſtrong loam, makes a good manure: marle of the blue kind, and clay of the lighter ſort, ſpread over gravelly or ſandy land, are of vaſt advantage to it, by making it more ſolid and tenacious; cow-dung and hog-dung are alſo excellent for hot lands.

If the land is ſtiff, cold, and clayey, ſheep and deer's dung are eſteemed by ſome the beſt manure; likewiſe the dung of horſes, pigeons, hens, geeſe, &c. are reckoned excellent; alſo ſea and drift ſands, or ſea-coal aſhes, are good manure for theſe ſort of lands: tanners bark, laid in a heap and rotted, is an excellent manure for ſtiff cold land; and one load of it will improve the ground more, and laſt longer, than two loads of any other manure: when this is laid on graſs, it ſhould be done ſoon after Michaelmas, that the winter rains may waſh it into the earth; and where it is uſed for corn land, it ſhould be ſpread on the ſurface before the laſt plowing, that it may be turned down for the fibres of the corn to reach it in the ſpring. Rotten vegetables, of moſt ſorts, alſo greatly enrich land; ſo that, where other manure is ſcarce, theſe may be uſed with great ſucceſs: thus the weeds of ponds, lakes, and ditches, being dragged out juſt as they begin to flower, and laid on heaps to rot, will make an excellent manure; but it is to be obſerved, that in rotting theſe vegetables, it will be proper to mix ſome earth, mud, or any other ſuch like ſubſtance, with them, to prevent their taking fire in their fermentation: it will alſo be neceſſary to cover the heaps with earth, mud, or dung, to detain the ſalts, otherwiſe many of the finer parts will evaporate in fermenting.

The refuſe of kitchen-gardens, when laid on heaps and rotted, will alſo afford good manure for corn land: and alſo fern, mowed down while it is green and tender, and laid on heaps to rot, will make an excellent manure; and by frequently mowing it, this troubleſome plant will be deſtroyed.

The aſhes of all kinds of vegetables are alſo good manure for lands, ſo that where the ground is over-run with buſhes, brambles, &c. if they are grubbed up in ſummer, dried, and conſumed to aſhes, and ſpread over the land, they will greatly improve it.

Rotten wood, and ſaw-duſt when rotted, are a very good manure for ſtrong lands, as are alſo bones, horns, ſhells, woollen-rags, &c. and whatſoever ſerves to looſen its parts.

But for all ſtubborn clayey ſoils, there is no manure ſo good as the cleanſing of the ſtreets of large cities, the parts of tough land will be more expeditiouſly ſeparated by this, than any other compoſt, and where it is to be had, it is of the greateſt value both for field or garden land.

MANUSCRIPT, in matters of literature, denotes a written book, in contradiſtinction to a printed one.

MAP, a plane figure repreſenting either part, or the whole ſurface of the earth, according to the laws of projection; diſtinguiſhing the ſituation of cities, mountains, rivers, &c.

But whether they are univerſal or particular, they are called geographical or land maps, in contradiſtinction to hydrographical charts, repre[illegible] together with the ſea-coaſts, rock[illegible]

As a map is a repreſentation of ſome part of the ſurface of the earth delineated upon a plane; the earth being round no part of the ſpherical ſurface of it can be accurately exhibited on a plane, and thence it has been propoſed to make globular maps. In order to this, plates of braſs were to be hammered out; or, to ſave expence, pieces of paſteboard were to be formed into ſegments of a ſphere, and covered on their convex ſides with maps, projected in the ſame manner as the papers of the common globes are. A map made in this manner would ſhew every particular, in a very accurate manner; but they are not in uſe at preſent.

The ancients deſcribed all the parts of the known earth in one general map; in this view one of them compares the ſhape of the earth to the leather of a ſling, whoſe length exceeds its breadth: the length of the then known parts of the earth from eaſt to weſt was conſiderably greater than from north to ſouth, for which reaſon, the former of theſe was called the longitude, and the other the latitude.

The modern general maps are ſuch as give us a view of an entire hemiſphere, or half of the globe; and are projected upon the plane of ſome great circle, which terminates the projected hemiſphere, and divides it from the other half of the globe, as the equator, or the meridian, or horizon of ſome place: from this circle the projection is denominated, and ſaid to be equatorial, meridional, or horizontal.

Particular maps are ſuch as exhibit to us leſs than an hemiſphere; of this ſort are maps of the great parts into which the earth is divided, as Europe, Aſia, Africa, North America, South America; or maps of particular kingdoms, provinces, countries, or of leſs diſtricts.

In maps three things are chiefly required; the firſt is the longitude and latitude, performed, by means of the meridians and parallels delineated upon them, in what manner ſoever they be projected; and they do this the more accurately, the greater number they have of meridians and parallels. The ſecond requiſite is to exhibit the ſhape of countries the ſame, and the extent of them in the ſame proportion, as upon the globe: this cannot be done accurately in any general maps, except globular ones; but in particular maps, which take in but a ſmall part of the earth, as a province or county, the defect will not be ſenſible. The third is that the bearings and diſtances of places from one another be truly ſhewn: this in globular maps ſhould be done in the ſame manner as upon the globe.

The projections of the circles in general maps are of two ſorts, convex and concave: to underſtand which we may imagine the globe upon which the circles are delineated to be of thin glaſs, and that half of it is viewed at a time; now we may be conceived to view this hemiſphere, either on the convex or concave ſide, and we may conceive it to be placed at different diſtances from the eye; from which diverſity of our view, there will ariſe different projections, or pictures of it in a map. If the eye be ſuppoſed to be placed in ſome point of the ſurface of the ſphere to view the concave of the oppoſite hemiſphere, it is called the ſtereographick projection, which is either equatorial, meridional, or horizontal.

The equatorial projection ſuppoſes the eye to be ſituated in one of the poles of the earth, and from thence to view the oppoſite concave hemiſphere, with its circles, projected upon a plane of glaſs paſſing through the equator: thus the eye is ſuppoſed to be in the north pole, in order to view the ſouthern hemiſphere; and in the ſouth pole to view the northern hemiſphere. Here the meridians are all ſtraight lines, and the parallels are compleat circles.

The meridional projection ſuppoſes the eye to be in ſome point of the equator, and from thence to view the oppoſite concave hemiſphere, projected upon a glaſs plane paſſing through ſome meridian, with a meridian drawn through the eye cuts at right-angles. Here all the meridians are arches of circles, except that drawn through the eye, which is a ſtraight line; and all the parallels are arches of circles, and the equator is a ſtraight line.

In the horizontal projection, the eye is ſuppoſed to be in that point of the ſurface of the globe which is diametrically oppoſite to the place upon the horizon of which the projection is made, and from thence to view the oppoſite concave hemiſphere with its circles projected upon a glaſs plane paſſing through that horizon: thus, if we project any map of this ſort upon the horizon of London, the eye is ſuppoſed to be in the place of the antipodes to London, and from thence to view the concave hemiſphere. The chief advantage of theſe kinds of maps is this, that the place, upon the horizon of which the map is projected, is always in the centre of it, and we may plainly perceive the bearings of all the other places from it.

A particular map is a part of a general one, and may be made on the ſame principles, as by projecting a large hemiſphere, and taking ſo much of it as the map is deſigned to contain.

When we are to make a map of a very ſmall diſtrict, as of a county or hundred, whatever part of the earth it may be in, the meridians and parallels may be equidiſtant ſtraight lines, drawn through every minute, &c. of longitude according to the intended largeneſs of the map. See PLOTTING and SURVEYING.

If the eye be ſuppoſed to view the hemiſphere at an infinite diſtance, the projection of its circles, whether it be viewed on the convex or concave ſide, is called orthographick. In this projection the parts about the middle are very plainly repreſented, but the extreme parts are prodigiouſly contracted. See *Orthographick* PROJECTION *of the Sphere*.

This projection like the former is divided into equatorial, meridional, and horizontal. In a general map of the northern hemiſphere, projected orthographically upon the plane of the equator, the meridians are all ſtraight lines, and the parallels complete circles.

In a general map of an hemiſphere projected orthographically on the plane of the meridian, all the meridians are projected into ſemi-ellipſes, except that particular meridian which paſſes through the middle or the eye, and which is therefore a ſtraight line. This projection has one advantage not to be found in any other general map, viz. that the decreaſe of the parallels from the equator to both the poles, appears therein in its true proportion.

The orthographick horizontal projection has great variety, according to the different latitudes of places, and is pretty difficult to execute. The great contraction of the extreme parts in the orthographick projection, renders it ſo deficient in the ſecond quality required in maps, that it is ſeldom uſed, except when the diſk of the earth, in a ſolar eclipſe, is to be repreſented.

The uſe of maps is obvious from their conſtruction. The degrees of the meridians and parallels, ſhew the longitudes and latitudes of places: their bearings from each other appear from inſpection, and their diſtances may be meaſured either from proper ſcales annexed, or by the diviſions on the meridian, equator, &c.

MAPLE, *Acer*, in botany, a genus of trees producing male and hermaphrodite flowers, each having five ovate petals which ſpread over the cup. The ſtamina are eight ſhort filaments, topped with ſimple antheræ, which are crowned with a cruciform pollen. The fruit conſiſts of a number of capſules, which grow together at the baſe, and are compreſſed, roundiſh, and each terminated by a very large membranaceous ala. The ſeeds are ſingle and roundiſh. The common maple is ſo well known as to require no deſcription. Moſt of the different ſpecies are propagated by ſowing their ſeeds ſoon after they are ripe, which is in autumn, and the ſucceeding year they will be fit to be planted in rows about three feet aſunder and two feet diſtance in the rows, where they may remain three or four years, when they will be large enough to be tranſplanted where they are intended to remain.

The timber of the common maple is far ſuperior to beech for turners uſe, particularly diſhes, cups, trenchers, &c. and when it abounds with knots (as it very often doth) it is highly eſteemed by the joiners for inlaying, &c. and alſo, for the lightneſs of the wood, is often employed by thoſe that make muſical inſtruments; and, for the whiteneſs of it, was formerly in great requeſt for tables, &c.

MARANTA, Indian arrow-root, in botany, a genus of plants, whoſe flower is monopetalous and ringent; the tube of which is oblong, compreſſed, and crooked, and its limb cut in ſix ſegments; it hath one membranaceous filament, with a linear anthera faſtened to the border of the filament. The fruit is a roundiſh

capſule,

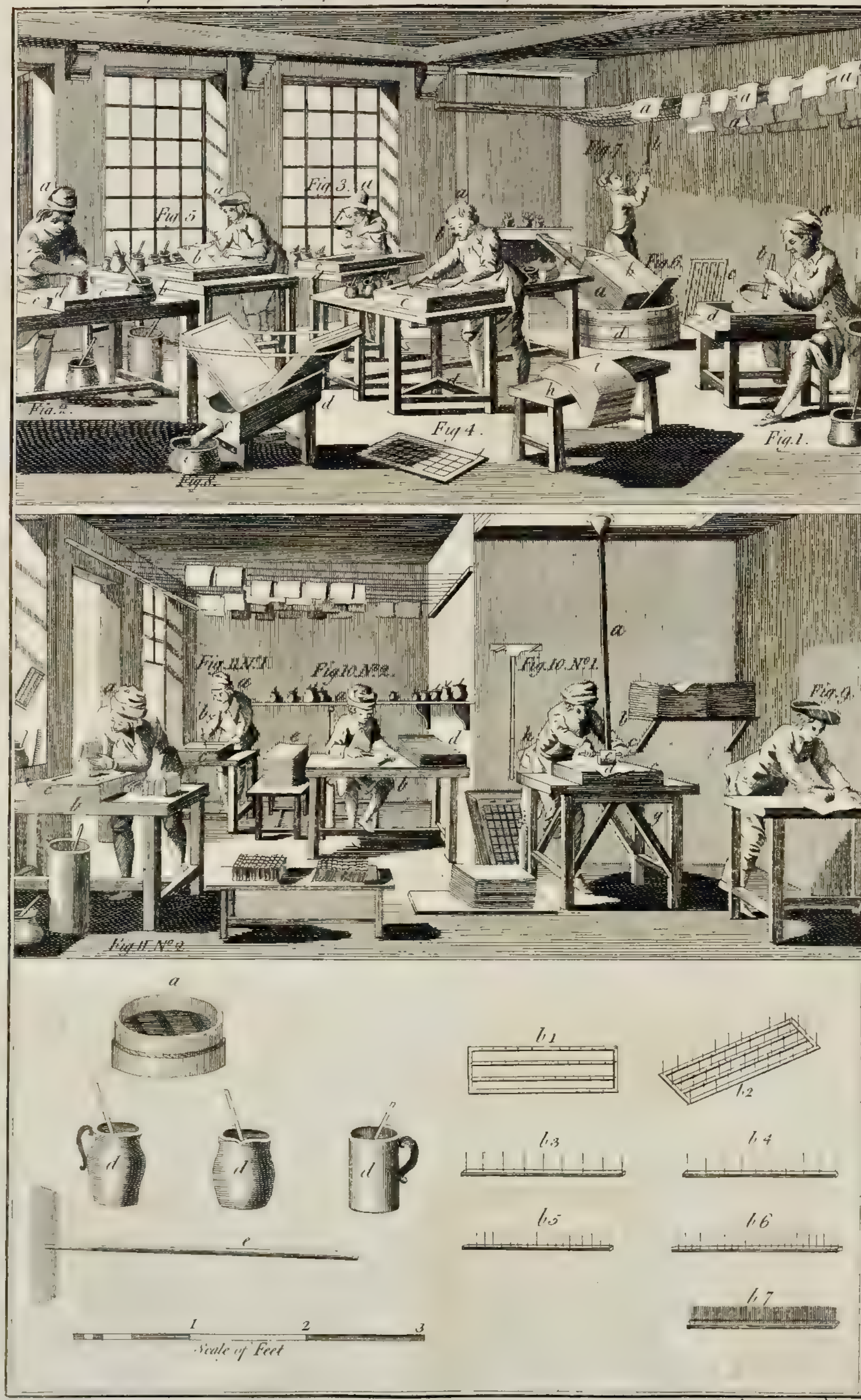

Plate LIV. facing Marbling.

The New Complete Dictionary of Arts & Sciences By The Revd. Wm. Middleton, &c.

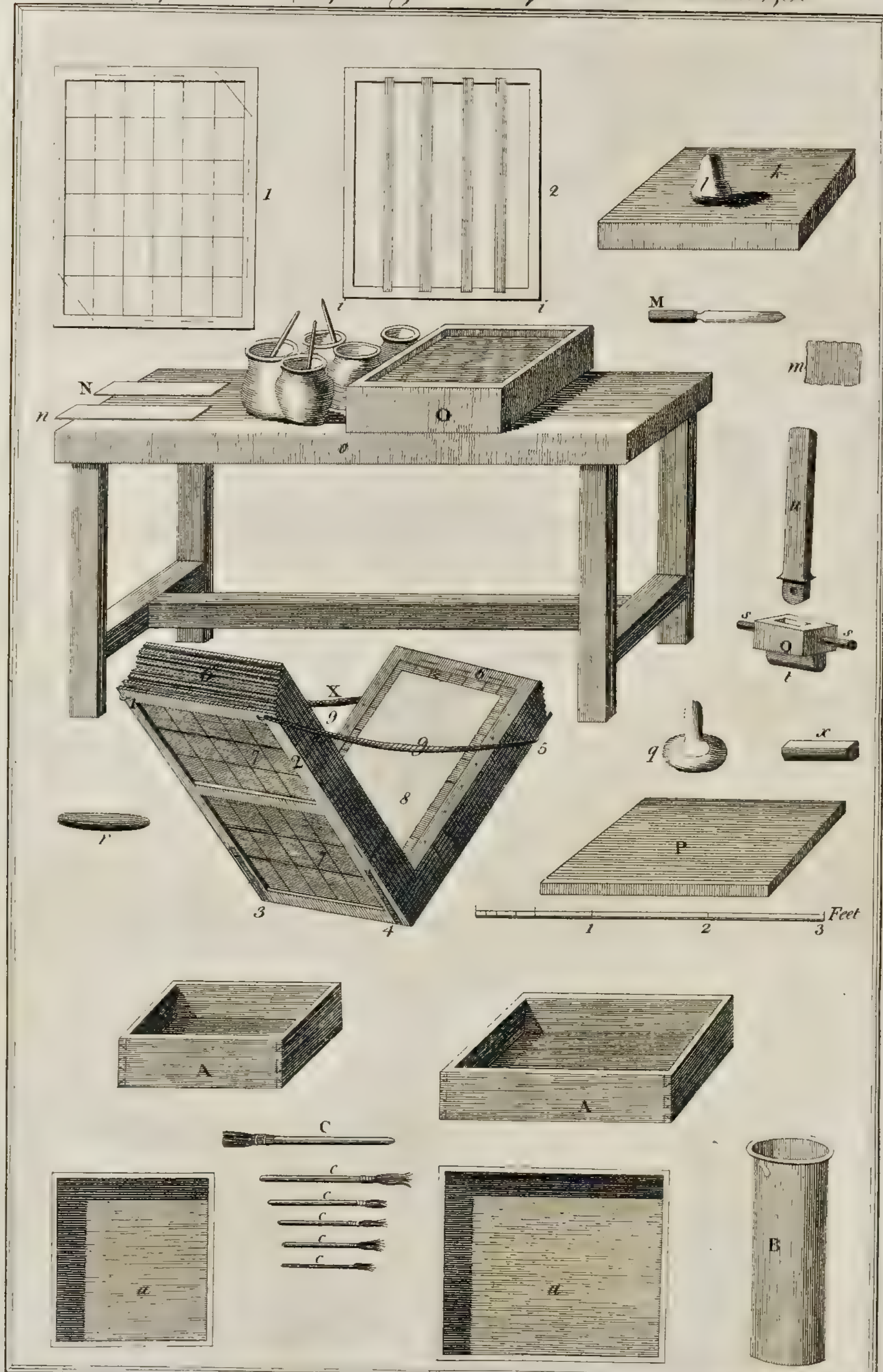

Plate LV.

facing Marbling.

capfule, obfcurely trigonal, containing a hard, rough, ovate feed.

MARBLE, *Marmor*, in natural hiftory, a genus of foffils, being bright and beautiful ftones, compofed of fmall feparate concretions, moderately hard, not giving fire with fteel, fermenting with, and foluble in acid menftrua, and calcining in a flight fire.

The colours of marbles being a very obvious and ftriking character, they are arranged according to them, in the following divifions. 1. Of the white plain marbles there are two forts; the Parian marble of the ancients, and ftatuary marble of the moderns, an extremely bright and elegant marble; and the Carrara marble, a very fine marble, more compact and clofe than the former, but lefs bright. 2. Of the plain yellowifh marbles there is only one fort, which is a hard, pale yellow, and gloffy marble, found in many parts of Italy. 3. Of the bluifh and black marbles there are a great many fpecies, as the Chian marble, Bafaltes, &c. 4. Of the plain green marbles there is only one kind, the Lacedæmonian marble of the ancients. 5. The pale-coloured or whitifh brown, commonly called Derby marble. 6. The green marbles with fhells. 7. The black Coralloide marble, with and without fhells. 8. Of the white variegated marble there are a great many fpecies, variegated with purple, brown, red, blue, &c. 9. Of the brown variegated marbles there are likewife feveral forts, fome with red veins, others with white, black, or brown veins. 10. Of the yellow veined and variegated marbles fome are veined with purple, and others with blue. 11. Of the black variegated marbles, fome are veined with white, and others with blue, yellow, red, &c. 12. The green variegated marbles are likewife diftinguifhed by the colour of their veins. 13. The grey fpotted marbles are variegated, fome with black and others with green fpots. 14. The red variegated marble is the Brocatello of the Italians, with white and gold veins.

Polifhing of MARBLE is performed by firft rubbing them well with a free-ftone, or fand, till the ftrokes of the axe are worn off, then with pumice ftone, and afterwards with emery.

Colouring of MARBLE. The colouring of marble is a nice art, and in order to fucceed in it, the pieces of marble, on which the experiments are tried, muft be well polifhed, and clear from the leaft fpot or vein. The harder the marble is, the better it will bear the heat neceffary in the operation; therefore, alabafter and the common foft white marble are very improper to perform thefe operations upon.

Heat is always neceffary for the opening the pores of the marble, fo as to render it fit to receive the colours; but the marble muft never be made red-hot, for then, the texture of the marble itfelf is injured, and the colours are burnt, and lofe their beauty. Too fmall a degree of heat is as bad as too great; for, in this cafe, though the marble receive the colour, it will not be fixed in it, nor ftrike deep enough. Some colours will ftrike even cold, but they are never fo well funk in as when a juft degree of heat is ufed. The proper degree is that which, without making the marble red, will make the liquid boil upon its furface. The menftruums ufed to ftrike in the colours, muft be varied according to the nature of the colour to be ufed. A lixivium made with horfe's or dog's urine, with four parts quick-lime, and one part pot-afhes, is excellent for fome colours; common ley of wood-afhes does very well for others: for fome, fpirit of wine is beft; and, finally, for others, oily liquors, or common white-wine.

The colours which have been found to fucceed beft with the peculiar menftruums, are thefe: ftone-blue diffolved in fix times the quantity of fpirit of wine, or of the urinous lixivium; and that colour which the painters call litmoufe, diffolved in common ley of wood-afhes. An extract of faffron, and that colour made of buckthorn berries, and called by the painters fap green, both fucceed well diffolved in urine and quick-lime, and tolerably well in fpirit of wine. Vermillion, and a fine powder of cochineal, fucceed alfo very well in the fame liquors. Dragon's blood fucceeds very well in fpirit of wine, as does alfo a tincture of logwood, in the fame fpirit. Alkanet root gives a fine colour, but the only menftruum to be ufed for this is oil of turpentine; for neither fpirit of wine, nor any lixivium, will do with it. There is another kind of fanguis draconis called dragon's blood in tears, which, mixed with urine alone, gives a very elegant colour.

Befides thefe mixtures of colours and menftruums, there are fome colours which are to be laid on dry and unmixed. Thefe are dragon's blood, of the pureft kind, for a red; gamboge for a yellow; green-wax for a green; common brimftone, pitch, and turpentine, for a brown colour. The marble, for thefe experiments, muft be made confiderably hot, and then the colours are to be rubbed on dry in the lump. Some of thefe colours, when once given, remain immutable; others are eafily changed or deftroyed. Thus the red colour given by dragon's blood, or by a decoction of logwood, will be wholly taken away by oil of tartar, and the polifh of the marble not hurt by it.

A fine gold colour is given in the following manner: take crude fal armoniack, vitriol, and verdigreafe, of each equal quantities; white vitriol fucceeds beft, and all muft be thoroughly mixed in fine powder.

The ftaining of marble to all the degrees of red or yellow, by folutions of dragon's blood or gamboge, may be done by reducing thefe gums to powder, and grinding them, with the fpirit of wine, in a glafs mortar; but, for fmaller attempts, no method is fo good as the mixing a little of either of thefe powders with fpirit of wine, in a filver fpoon, and holding it over burning charcoal. By this means a fine tincture will be extracted, and, with a pencil dipped in this, the fineft traces may be made on the marble, while cold, which, on the heating it afterwards, either on fand, or in a baker's oven, will all fink very deep, and will remain perfectly diftinct in the ftone. It is very eafy to make the ground colour red or yellow by this means, and leave white veins in it. This is to be done by covering the places where the whitenefs is to remain, with fome white paint, or even with two or three doubles only of paper, either of which will prevent the colour from penetrating in that part. All the degrees of red are to be given to marble by means of this gum alone: a flight tincture of it, without the affiftance of heat to the marble, gives only a pale flefh colour, but the ftronger tinctures give it yet deeper; to this the affiftance of heat adds yet greatly; and, finally, the addition of a little pitch to the tincture gives it a tendency to blacknefs, or any degree of deep red that is defired.

A blue colour may be given alfo to marble by diffolving turnfol in a lixivium of lime and urine, or in the volatile fpirit of urine; but this has always a tendency to purple, whether made by the one or the other of thefe ways. A better blue, and ufed in an eafier manner, is furnifhed by the Canary turnfol, a fubftance well known among the dyers: this needs only to be diffolved in water, and drawn on the place with a pencil; this penetrates very deep into the marble, and the colour may be increafed by drawing the pencil, wetted afrefh, feveral times over the fame lines. This colour is fubject to fpread and diffufe itfelf irregularly; but it may be kept in regular bounds, by circumfcribing its lines with beds of wax, or any other fuch fubftance. It is to be obferved, that this colour fhould be always laid on cold, and no heat given even afterwards to the marble; and one great advantage of this colour is, that it is therefore eafily added to marble already ftained with any other colours, and it is a very beautiful tinge, and lafts a long time.

Arundel MARBLES, ancient marbles with a chronicle of the city of Athens infcribed on them, many years before our Saviour's birth; prefented to the univerfity of Oxford by Thomas earl of Arundel, whence the name.

MARBLING, the method of preparing and colouring marble paper, &c.

There are feveral kinds of marble paper; but the principal difference of them lies in the forms in which the colours are laid on the ground: fome being difpofed in whirles or circumvolutions; fome in jagged lengths; and others only in fpots of a roundifh or oval figure. The general manner of managing each kind is, neverthelefs, the fame: being the dipping the paper in a folution of gum-tragacanth, or, as it is commonly called, gum-dragon; over which the colours, previoufly prepared with ox-gall and fpirit of wine, are firft fpread.

The peculiar apparatus neceffary for this purpofe, is a trough for containing the gum-tragacanth, and the colours; a comb for difpofing them in the figure ufually chofen;

chosen; and a burnishing stone for polishing the paper. The trough may be of any kind of wood; and must be somewhat larger than the sheets of paper for marbling, which it is to be employed; but the sides of it need only rise about two inches above the bottom; for by making it thus shallow, a less quantity of the solution of the gum will serve to fill it. The comb may be also of wood, and five inches in length; but should have brass teeth, which may be about two inches long, and placed at about a quarter of an inch distance from each other. The burnishing stone may be of jasper, or agate; but as those stones are very dear, when of sufficient largeness, marble or glass may be used, provided their surface be polished to a great degree of smoothness.

These implements being prepared, the solution of gum-tragacanth must be made, by putting a sufficient proportion of the gum, which should be white, and clear from all foulness, into clean water; a letting it remain there a day or two, frequently breaking the lumps and stirring it, till the whole shall appear dissolved, and equally mixed with water. The consistence of the solution should be nearly that of strong gum-water, used in miniature painting; and if it appear thicker, water must be added, or if thinner, more of the gum. When the solution is thus brought to a due state, it must be passed through a linen cloth, and being then put into the trough, it will be ready to receive the colours.

The colours employed for red are carmine, lake, rose-pink, and vermillion; but the two last are too hard and glaring, unless they be mixed with rose-pink, or lake, to bring them to a softer cast: and with respect to the carmine and lake, they are too dear for common purposes: for yellow, Dutch pink and yellow oker may be employed: for blue, Prussian blue and verditer may be used: for green, verdigrease, a mixture of Dutch pink and Prussian blue, or verditer, in different proportions: for orange, the orange-lake, or a mixture of vermillion, or red lead, with Dutch pink: for purple, rose-pink and Prussian blue.

These several colours should be ground with spirit of wine till they be of a proper fineness; and then, at the time of using them, a little fish-gall, or in default of it, the gall of the beast should be added, by grinding them over again with it. The proper proportion of the gall must be found by trying them; for there must be just so much as will suffer the spots of colour, when sprinkled on the solution of the gum-tragacanth, to join together, without intermixing or running into each other.

When every thing is thus prepared, the solution of the gum-tragacanth must be poured into the trough; and the colours, being in a separate pot, with a pencil appropriated to each, must be sprinkled on the surface of the solution, by shaking the pencil, charged with its proper colour, over it; and this must be done with the several kinds of colour desired, till the surface be wholly covered.

When the marbling is proposed to be in spots of a simple form, nothing more is necessary, but where the whirles or snail-shell figures are wanted, they must be made by means of a quill; which must be put among the spots to turn them about, till the effect be produced. The jagged lengths must be made by means of the comb above described, which must be passed through the colours from one end of the trough to the other, and will give them that appearance; but if they be desired to be pointed both ways, the comb must be again passed through the trough in a contrary direction; or if some of the whirles or snail-shell figures be required to be added, they may be yet made by the means before directed.

The paper should be previously prepared for receiving the colours, by dipping it over night in water; and laying the sheets on each other with a weight over them. The whole being thus ready, the paper must be held by two corners, and laid in the most gentle and even manner on the solution covered with the colours; and there softly pressed with the hand, that it may bear every where on the solution. After which it must be raised and taken off with the same care, and then hung to dry across a proper cord, subtended near at hand for that purpose: and in that state it must continue, till it be perfectly dry. It then remains only to give the paper a proper polish; in order to which it is first rubbed with a little soap; and then must be thoroughly smoothed by the glass polishers, such as are used for linen, and called the calendar glasses. After which it should be again rubbed by a burnisher of jasper or agate; or, in default of them, of glass ground to the highest polish: for on the perfect polish of the paper depends in a great measure its beauty and value.

Marbling of books or paper is performed thus: dissolve four ounces of gum-arabick into two quarts of fair water; then provide several colours mixed with water in pots or shells, and with pencils peculiar to each colour, sprinkle them by way of intermixture upon the gum-water, which must be put into a trough, or some broad vessel: then with a stick curl them, or draw them out in streaks, to as much variety as may be done. Having done this, hold your book or books close together, and only dip the edges in, on the top of the water and colours, very lightly; which done, take them off, and the plain impression of the colours in mixture will be upon the leaves; doing as well the ends as the front of the book in the like manner.

Marbling a book on the covers is performed by forming clouds with aqua fortis, or spirit of vitriol mixed with ink, and afterwards glazing the covers. See Book-Binding.

In order to give a more adequate idea of this curious process, we have illustrated the above description on which the whole is represented to the eye.

Explanation of Plate LIV. *Upper compartment.*

Fig. 1.) *a*, a workman mixing the gum water; *b*, a small brush; *c*, the tub containing the gum-water; *d*, a shallow tub to receive the gum-water, that may be thrown over the sides of the former during the operation; *e*, a vessel containing the tempered gum.

Fig. 2.) *a*, a workman grinding the colours; *b*, the table; *c*, the stone; *d*, the muller; *a*, a scraper of leather.

Fig. 3.) *a*, a workman sprinkling the colours on the gum-water; *b*, the pencil, or brush, filled with colour; *c*, the shallow tub containing the gum-water; *d*, the table that supports the tub.

Fig. 4.) *a*, a workman employed in making the different, streaks &c. in the colours; *b*, the comb; *c*, the tub; *d*, the table.

Fig. 5.) *a*, a workman placing the sheets of paper on the colour; *b*, the sheet of paper.

Fig. 6.) *a*, a frame, or pile of marbled paper; *b*, a cord by which it is bound together; *c*, a bar of wood which supports the paper, and to which the cord is fastened; *d*, a tub, which receives the water that drains from the paper; *g*, a frame on which the sheets of paper are placed to drain, before they are marbled; *h*, a stool; these are placed as in *fig.* 8.

Fig. 7.) A person hanging the paper up to dry; *a*, the sheets of paper already hung up to dry; *b*, the peel; *c*, the person.

Fig. 8.) Frames with the marbled paper placed in a proper position for draining; *c*, *d*, a trough that receives the fluid draining from the paper; *e*, the vessel that receives the fluid.

Plate LIV. *The next compartment.*

Fig. 9.) A workman polishing a sheet of marbled paper.

Fig. 10.) No. 1. A polishing machine; *a*, the shaft of the machine; *b*, the part to which the polisher is fixed; *c*, the handle; *d*, the polisher; *e*, the piece to which the upper extremity of the polisher is fixed; *f*, the marble; *g*, the table supporting the stone on which the paper is polished; *h*, a workman polishing a sheet.

Fig. 10.) No. 2. *a*, a workman employed in folding the sheets; *b*, the folded sheets; *c*, the folding knife; *d*, a pile of sheets lying upon the table; *e*, a heap of sheets folded.

Fig. 11) No. 1. *a*, a workman employed with his point in drawing figures on the colours; *b*, the point; *c*, the tub.

Fig. 11.) No. 2. *a*, a workman marbling books, of which he takes two or three volumes in his hands at once and dips them into the tub; *b*, the books; *c*, the tub.

Bottom of the Plate.

A, a sieve for straining the gum-water; *b* 1, *b* 2, *b* 3 *b* 4, *b* 5, *b* 6, *b* 7, combs of different sizes and forms, for tracing different figures on the surface of the colours; *c*, a spatula or slice for tempering the gum; *d*, *d*, *d*, pots for holding colours, with the pencils or brushes; *e*, a peel for hanging up the paper to dry.

Plate LV. *Upper compartment.*

i, *i*, *i*, *i*, 1, 2. Two different frames; *k*, a ſtone and muller for grinding colours; *k*, the ſtone; *l*, the muller.

M, a knife for ſcraping off the colours that adhere to the ſtone; N, *n*, inſtruments for replacing the colours on the ſurface of the water, after they are diſturbed, by a ſheet of paper; O, a veſſel filled with gum-water, and the ſurface covered with different colours; *o*, the table; P, a poliſhing ſtone; *q*, a glaſs poliſher; Q, a poliſher for the machine already deſcribed; *s*, *s*, the handles of the poliſher; *t*, the poliſhing part; *u*, part of the ſhaft within its tenon, which enters the mortiſe of the poliſher; *r*, a folding ſtick of box or ivory; X, two frames drawn on a large ſcale, and fixed at a proper angle, at the points 3, 4, 6, 6, ſeveral ſheets of paper one upon another, 7, 7, the two compartments of a frame where the wires are viſible; 8, a ſheet of paper ſtretched out; 9, 9, two cords by which the frames are fixed at a proper angle.

Bottom of the Plate.

A, A, ſmall bacs, with their plans *a*, *a*; B, a pot for tempering the gum-water; C, a large bruſh; *c*, *c*, *c*, *c*, bruſhes of a ſmaller ſize.

MARCASITES, *Marchaſitæ*, in natural hiſtory, are defined to be compound inflammable metallick bodies, of a hard and ſolid ſubſtance, of an obſcurely and irregularly foliaceous ſtructure, of a bright glittering appearance, naturally conſtituting whole ſtrata, though ſometimes found in detached maſſes; very freely giving fire with ſteel; not fermenting with acid menſtruums; and when put into the fire, yielding a blue ſulphureous flame, and afterwards calcining into a purple powder.

There are only three known ſpecies of this genus: 1. The ſilver-coloured marcaſite, found in vaſt abundance in lead and tin-mines. 2. The gold-coloured marcaſite. 3. The heavy pale-white marcaſite.

Marcaſites were at firſt ſuppoſed to be almoſt all pure gold or ſilver, according to their colour; but experience has ſhewn, that if they contain any metal at all, no method has hitherto been found of working them to advantage. In Germany, indeed, they extract ſulphur and vitriol from the ſilver marcaſite, which two ſubſtances are always contained in it; and beſides theſe, it has uſually a quantity of arſenick. It has been recommended as a ſtyptick, after being calcined; but as the arſenick may not be all carried off by that operation, its uſe as a medicine ſeems extremely dangerous.

MARCGRAVE, or MARGRAVE, a degree of honour in Germany anſwering to our marquis.

MARCH, *Martius*, the third month of the year, reckoning from January, as the firſt, which, for the future, is by act of parliament to begin the year.

MARCHET, *Marchetta*, a pecuniary fine, anciently paid by the tenant to the lord upon the marriage of one of the tenant's daughters.

MARINE implies in general the whole navy of a kingdom or ſtate, comprehending all the royal dock-yards, and the officers, artificers, ſeamen, ſoldiers, &c. employed therein, as well as the ſhipping employed by merchants for military or commercial purpoſes, together with whatever relates to navigation, ſhip-building, ſailors, and marines. The hiſtory of the marine affairs of any one ſtate is a very comprehenſive ſubject, much more that of all nations. Thoſe who would be informed of the maritime affairs of Great Britain, and the figure it has made at ſea in all ages, may find abundance of curious matter in Selden's *Mare Clauſum*, and from his time to ours, we may trace a ſeries of facts in Lediard's and Burchet's Naval Hiſtory: but above all, in the Lives of the Admirals, by the accurate and judicious Dr. Campbell.

Not only the preſervation of that ſhare of commerce we at preſent poſſeſs, but its future advancement, and even the very being of Britain, as an independent empire, and a free people, depend no leſs on the good condition and the wiſe regulation of our affairs of the marine, than on the ſuperiority of its naval power. The Delphian oracle being conſulted by the Athenians on the formidable armament and innumerable forces of Xerxes, returned for anſwer, "That they muſt ſeek their ſafety in wooden walls." To which we may affirm, that whenever this nation in particular has recourſe to her floating bulwarks for her ſecurity and defence, ſhe will find ſtrength, wealth, and glory, to be the happy and infallible conſequence.

MARINES, or MARINE FORCES, a body of ſoldiers raiſed for the ſea-ſervice, and trained to fight either in a naval engagement, or in an action aſhore.

The great ſervice of this uſeful corps was manifeſted frequently in the courſe of the late war, particularly at the ſiege of Belleiſle, where they acquired a great character, although lately raiſed, and hardly exerciſed in military diſcipline. At ſea they are incorporated with the ſhip's crew, of which they make a part, and many of them learn in a ſhort time to be excellent ſeamen, to which their officers are ordered by the admiralty not to diſcourage them, although no ſea-officer is to order them to go aloft againſt their inclination. In a ſea-fight their ſmall arms are of very great advantage in ſcouring the decks of the enemy; and when they have been long enough at ſea to ſtand firm when the ſhip rocks, they muſt be infinitely preferable to ſeamen if the enemy attempts to board, by ranging a battalion with their fixed bayonets to oppoſe them. See BOARDING.

The marine forces of Great Britain in the time of peace are ſtationed in three diviſions; one of which is quartered at Chatham, one at Portſmouth, and another at Plymouth. By a late regulation they are ordered to do duty at the ſeveral dock-yards of thoſe ports, to prevent embezzlement of the king's ſtores, for which a captain's guard mounts every day; which certainly requires great vigilance, as ſo many abuſes of this kind have been committed, that many of the inhabitants, who have been long uſed to an infamous traffick of this kind, expect thoſe conveyances at certain periods, as their due, and of courſe reſent this regulation in the higheſt degree as an infringement of their liberty as Engliſhmen.

MARK, in commerce, a certain character put on various commodities, to ſhew where they were made and by whom; as alſo that they were inſpected by the officers, and paid the duty upon them.

MARK, or *Numero*, is alſo a particular character, which, when fixed on any commodity, the trader alone recollects the price it coſt him.

Knights of St. MARK, an order of knighthood, in the republick of Venice, under the protection of St. Mark the evangeliſt. The arms of the order are a lion winged gules, with this device, Pax tibi, Marce evangeliſta.

MARK, *Marc*, denotes a weight, as alſo ſeveral commodities, eſpecially gold and ſilver in France. It is divided into 8 ounces, 64 drachms, or 192 deniers or penny-weights, or 160 eſterlins, or 300 mailles, or 640 ferlins, or 4608 grains. In Holland the mark weight is the ſame as in France.

When gold and ſilver are ſold by the mark, it is divided into 24 carats, the carat into 8 penny-weights, and the penny-weight into 24 grains, and the grain into 24 primes.

MARK, alſo denotes money of account; and in ſome countries a coin. The Engliſh mark is 13s. and 4d. among the Saxons, it was equivalent to 7s. 6d. of our money. It is alſo a money of account in Scotland, and formerly a ſilver coin, being equal to 13d. and $\frac{1}{3}$ Engliſh.

MARK *Lubs*, or *Lubeck* MARK, a money of account at Hamburgh, equal to a third of the rixdollar, or to the French livre. It is divided into ſixteen ſols lubs.

MARK *Danſch*, a Daniſh coin, equal to ſixteen ſols lubs, or 20 French ſols.

MARK, is alſo a copper coin in Sweden, equal to two-pence farthing Engliſh; it is divided into 8 rouſtiqs, and each rouſtiq into two alleveures. The Swediſh ſilver mark is money of account, equal to three copper marks.

MARKET, a publick place in a city or town where proviſions are ſold. It alſo denotes a privilege of a place, either by grant or preſcription, to hold a market.

MARLE, a kind of dry, ſoft, foſſile earth, uſed for manuring land. The principal ſorts of marle are the white and red. Too much of it thrown on the ground is found to burn it. Marle is burnt like other ſtone for making of lime.

MARMALADE, a confection of the pulp of plumbs, apricots, quinces, &c. boiled with ſugar into a conſiſtence.

MAROTICK, STYLE, in the French poetry, a peculiarly gay, yet natural manner of writing, introduced by

by Marot, and ſince imitated with moſt ſucceſs by Voiture and Fontaine. The marotick makes a choice, whereas burleſque admits of all.

MARQUE, *Letter of* MARQUE, letters of repriſal, whereby the ſubjects of one country are licenſed, by the king or parliament, to make repriſals on thoſe of another; by reaſon application has been thrice made to the government to which the aggreſſor belongs, without any effect.

MARQUETRY, or INLAID-WORK, implies a curious work compoſed of ſeveral fine hard pieces of wood; of various colours, faſtened in thin ſlices on a ground, and ſometimes enriched with other matters, as ſilver, braſs, tortoiſe-ſhell, and ivory; with theſe aſſiſtances the art is now capable of imitating any thing; whence it is by ſome called the art of painting in wood.

The ground on which the pieces are to be arranged and glued, is uſually of well-dried oak or deal, and is compoſed of ſeveral pieces glued together, to prevent its warping. The wood to be uſed in marquetry is reduced into leaves, of the thickneſs of a line, or the twelfth part of an inch, and is either of its natural colour, or ſtained, or made black to form the ſhades by other methods: this ſome perform by putting it in ſand heated very hot over the fire: others, by ſteeping it in lime water and ſublimate: and others, in oil of ſulphur. The wood being of the proper colours, the contours of the pieces are formed according to the parts of the deſign they are to repreſent: this is the moſt difficult part of marquetry, and that which requires the moſt patience and attention.

The two chief inſtruments uſed in this work, are a ſaw and a wooden vice, which has one of its chaps fixed, and the other moveable, which is open and ſhut by the foot, by means of a cord faſtened to a treddle.

The leaves to be formed, of which there are frequently three, four, or more joined together, are, after they have been glued on the outermoſt part of the deſign, whoſe profile they are to follow, put within the chaps of the vice; then the workman preſſing the treddle, and thus holding faſt the piece, with his ſaw runs over all the outlines of his deſign. By thus joining or forming three or four pieces together, not only time is ſaved, but alſo the matter is the better enabled to ſuſtain the effort of the ſaw, which, how fine ſoever it may be, and how ſlightly ſoever it may be conducted by the workman, except this precaution were taken, would be apt to raiſe ſplinters, and ruin the beauty of the work. All the pieces having been thus formed by the ſaw, and marked, in order to their being known again, each is vaneered, or faſtened in its place, on the common ground, with the beſt Engliſh glue; and this being done, the whole is ſet in a preſs to dry, planed over, and poliſhed with the ſkin of the ſea-dog, wax, and, ſhave-graſs, as in ſimple vaneering, and the fine branches and more delicate parts of the figures are touched up and finiſhed with a graver.

MARQUIS, a title of honour, next in dignity to that of duke, firſt given to thoſe who command the marches, or borders and frontiers of countries.

Marquiſſes were not known in England till king Richard II. in the year 1337, created his great favourite, Robert Vere, the earl of Oxford, marquis of Dublin; ſince which time there have been many creations of this ſort, though at preſent there is but one Engliſh, three Scotch, and one Iriſh marquiſſes.

MARRIAGE, a contract both civil and religious, between a man and a woman, by which they engage to live together in mutual love and friendſhip, for the ends of procreation, &c.

MARROW, *Medulla*, in anatomy, a ſoft oleaginous ſubſtance contained in the cavity of the bones.

The marrow of the bones, which anatomiſts of many ages took to be a mere ſhapeleſs and irregular maſs of matter, is found in reality to conſiſt of a number of fine ſubtile fat oleaginous ſubſtances, and of a number of minute veſicles of a membranaceous ſtructure, in which it is ſecreted from the arterial blood in the ſame manner as the fat of the reſt of the body. It is contained in a greater or leſs quantity in the cavities of moſt of the cylindrical bones: in the cavernous bones there is not properly any marrow, but a kind of red, fatty, medullary juice. The medullary veſſels, found running here and there through their appropriated canals, penetrate into the inner cavity of the bones, and ſecrete the medullary part from the blood there; the blood being afterwards returned again by the veins. The nerves are diſtributed to the ſame places for the ſake of ſenſe and motion. It has been a common opinion, that the marrow increaſed and decreaſed in quantity according to the increaſe and decreaſe of the moon; but this is by modern anatomiſts thought idle and erroneous: it does, indeed, increaſe and decreaſe in its ſeveral cavities, according to the exerciſe or reſt of the animal, or to its eating more or leſs, or better or worſe food. The ſubtile oleaginous ſubſtance penetrates in between the fibres of the bones, and preſerves them from dryneſs and from that brittleneſs which would be the conſequence of it; but it does not nouriſh them as was originally believed. See BONE.

MARRUBIUM, hore-hound, in botany, a genus of plants, whoſe flower is monopetalous and labiated, the upper lip of which is erect, ſemibifid, and acute, and the under lip reflexed and cut into three ſegments; the ſeeds are four and contained in the cup. The common hore-hound, has a woody fibrous root, from which ariſe ſeveral hairy ſquare ſtalks which are furniſhed with hoary roundiſh leaves, wrinkled and crenated on their edges; the flowers proceed in whorles from the joints of the ſtalks in June, and are of a white colour, the whole plant has a ſtrong diſagreeable ſmell, and grows wild in many parts of England; it is aperient, and powerfully reſolves viſcid humours, and by ſome is accounted a ſpecifick in moiſt aſthmas, and in all diſeaſes of the breaſt and lungs: the doſe in infuſion is from half a handful to a handful, the dried leaves may be given to a dram or two.

MARS, in aſtronomy, one of the ſuperior planets, moving round the ſun in an orbit between thoſe of the earth and Jupiter. Its character is ♂. It has two ſigns of the zodiack given unto it, which are called its own houſes; viz. aries, ♈, and ſcorpio, ♏. See PLANET.

In the achronical riſing of this planet, that is, when it is in oppoſition to the ſun, it is found twice as near the earth as the ſun, which is a phænomenon that has greatly diſcredited the Ptolemaick hypotheſis. This planet, as well as the reſt, borrows its light from the ſun, and has its increaſe and decreaſe of light like the moon; and it may be ſeen almoſt diſſected when in its quadratures with the ſun, or its perigæum; but is never corniculated or falcated, as the inferior planets.

Dr. Hook, in 1665, obſerved ſeveral ſpots in this planet, which having a motion, he concluded the planet to have a turbinated motion round its centre. In 1666, M. Caſſini obſerved ſeveral ſpots in the two hemiſpheres of Mars, which, by continuing his different obſervations very diligently, he found to move by little and little from eaſt to weſt, and to return in the ſpace of 24 hours 40′ to their former ſituation. Whence both the motion and period or natural day of that planet were determined. See MACULÆ.

Mars always appears with a ruddy troubled light, whence we conclude that it is encompaſſed with a thick cloudy atmoſphere, which by diſturbing the rays of light in their paſſage and re-paſſage through it, occaſion that appearance: beſides the ruddy colour of Mars, we have another argument of his being encompaſſed with an atmoſphere, and it is this, that when any of the fixed ſtars are ſeen near his body, they appear extremely obſcure and almoſt extinct; and if this be the caſe, a ſpectator in Mars would ſcarce ever ſee Mercury, unleſs perhaps in the ſun at the time of conjunction, when Mercury paſſes over his diſk, as he ſometimes appears to us, in form of a ſpot.

An eye in Mars will ſee Venus at about the ſame diſtance from the ſun as Mercury appears to us, and the earth about the ſame diſtance from the ſun that Venus appears to us; and when the earth is found in conjunction with and very near the ſun, the eye in Mars will ſee the earth horned or falcated, and its attendant, the moon, of the ſame figure, and at its utmoſt diſtance from the earth not above 15 minutes of a degree: and as this planet's diſtance from the ſun is to the diſtance of the earth and ſun as $1\frac{1}{2}$ to 1, therefore a ſpectator in Mars would ſee the ſun's diameter leſs by one third than it appears to us, and conſequently the degree of light and heat which Mars receives from the ſun, is leſs by one third than that received by the earth; this proportion will, however, admit of a ſenſible variation, on account of the great eccentricity of this planet.

The New Complete Dictionary of Arts & Sciences By The Revd. Mr. Middleton &c.

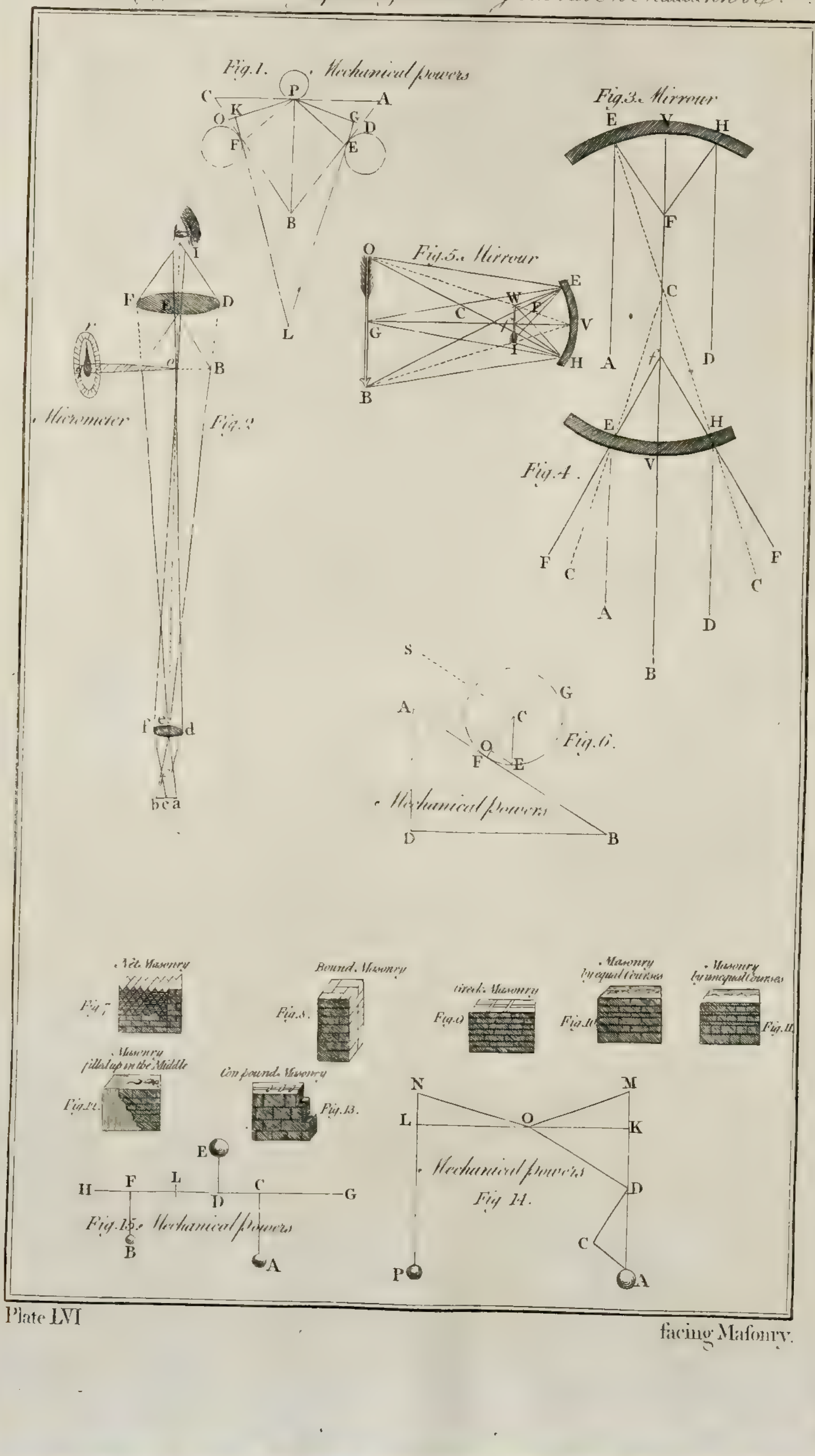

Plate LVI

facing Masonry.

Though the period or year of this planet, as has been already obſerved, is nearly twice as long as ours, and his natural day, or the time in which the ſun appears above the horizon (ſetting aſide the conſideration of twilight) is almoſt every where equal to his night: yet it appears that in one and the ſame place, on his ſurface, there will be but very little variety of ſeaſons, or ſcarce any difference of ſummer and winter: and the reaſon is, that the axis of his diurnal rotation is nearly at right angles with the plane of his orbit. It will be found, notwithſtanding, that places ſituated in different latitudes, that is, at different diſtances from his equator, will have very different degrees of heat, on account of the different inclination of the ſun's rays to the horizon, as it is with us when the ſun is in the equinoxes.

MARS, among the chymiſts, denotes iron, as being ſuppoſed to be under the influence of that planet. See IRON.

MARSHAL, in its primary ſignification, means an officer who has the command or care of horſes; but it is now applied to officers who have very different employments, as earl marſhal, knight-marſhal, or marſhal of the king's houſe, &c.

MARSHAL, or MARESCHAL, *of France*, an officer of the greateſt dignity in the French armies. When two or more mareſchals are in the army, the eldeſt commands.

MARSHALLING A COAT, in heraldry, is the diſpoſal of ſeveral coats of arms belonging to diſtinct families, in one and the ſame eſcutcheon or ſhield, together with their ornaments, parts, and appurtenances.

MARSHMALLOW, in botany. See the article ALTHÆA.

MARSHY LANDS, thoſe liable to be overflowed by the ſea, or large rivers.

MARTIAL, among phyſicians, an appellation given to the preparations of iron.

MARTIAL LAW, is the law of war, which entirely depends on the arbitrary power of the prince, or of thoſe to whom he has delegated it: for though the king can make no laws in time of peace without the conſent of parliament, yet in time of war he uſes an abſolute power over the army.

MARTIN, *Martes*, in zoology, a ſpecies of muſtela, of a blackiſh brown colour, and with a pale throat: it is about the ſize of the common cat, but more ſlender.

MARTIN is alſo the name of a bird of the hirundo kind, of a black colour, and with the throat white.

MARTINGALE, in the manage, a thong of leather faſtened to one end of the girths under the belly of a horſe, and at the other end to the muſs-roll, to keep him from rearing.

MARTLETS, in heraldry, little birds repreſented without feet, and uſed as a difference or mark of diſtinction for younger brothers, to put them in mind that they are to truſt to the wings of virtue and merit, in order to raiſe themſelves, and not to their feet, they having little land to ſet their feet on.

MARTYNIA, in botany, a genus of the didynamia angioſpermia claſs. The calix conſiſts of five ſegments; the corolla is ringent; and the capſule is woody, with a hooked beak, two valves, and three cells. There are two ſpecies, both natives of America.

MARTYR, in the Chriſtian ſenſe of the word, is one who lays down his life for the goſpel, or ſuffers death for the ſake of his religion. The feſtivals of the martyrs are of very ancient date in the Chriſtian church, and may be carried back at leaſt till the time of Polycarp, who ſuffered martyrdom about the year of Chriſt 168. On theſe days the Chriſtians met at the graves of the martyrs, and offered prayers and thankſgivings to God for the examples they had afforded them; they celebrated the euchariſt, and gave alms to the poor; which, together with a panegyrical oration or ſermon, and reading the acts of the martyrs, were the ſpiritual exerciſes of theſe anniverſaries.

MARTYROLOGY, in the church of Rome, is a catalogue or liſt of martyrs, including the hiſtory of their lives and ſufferings for the ſake of their religion.

MARUM, *Syrian-maſtich*, in botany, a low ſhrubby plant, with leaves like thoſe of thyme, but hoary; the flowers are of the labiated kind, and grow in whorled ſpikes; they appear in July and Auguſt.

Marum is reputed cephalick, and good in all diſorders of the nerves, and alſo for ſtopping hæmorrhages.

MASCULINE, or MASCULINE-GENDER, among grammarians, that belonging to the male. See GENDER.

MASON, a perſon employed under the direction of an architect, in the raiſing of a ſtone building. The chief buſineſs of a maſon is to make the mortar, raiſe the walls from the foundation to the top, with the neceſſary retreats and perpendiculars; to form the vaults, and employ the ſtones as delivered to him. When the ſtones are large, the buſineſs of hewing or cutting them belongs to the ſtone-cutters, though theſe are frequently confounded with maſons: the ornaments of ſculpture are performed by carvers in ſtone or ſculptors.

MASONRY in general, a branch of architecture, conſiſting of the art of hewing or ſquaring ſtones, and cutting them level or perpendicular, for the uſes of building; but in a more limited ſenſe, maſonry is the art of aſſembling and joining ſtones together with mortar. Authors mention ſeven pieces of maſonry, viz.

Net MASONRY, called reticulatum by Vitruvius, from its reſemblance to the maſhes of a net, which conſiſts of ſtones ſquared in their courſes, and ſo diſpoſed, as that their joints go obliquely, the one diagonal being perpendicular and the other level. This is the moſt pleaſing to the eye, but apt to crack. (*Plate* LVI. *fig.* 7.)

Bound MASONRY, *Inſerta*, that wherein the ſtones are placed over one another, like tiles; the joints of the beds being level, and the mounters perpendicular: ſo that the joint which mounts and ſeparates two ſtones, falls directly over the middle of the ſtone below. This is more durable than the network. (*Fig.* 8.)

Greek MASONRY, or double binding, that where after we have laid two ſtones, each of which make a courſe, another is laid at the end, which makes two courſes, and ſo on throughout. (*Fig.* 9.)

MASONRY *by equal Courſes*, *Iſodomum*, differs from bound maſonry only in that its ſtones are not hewn. (*Fig.* 10.)

MASONRY *by unequal Courſes*, *Pſeudiſodomum*, made of unhewed ſtones laid in bound work, not of the ſame thickneſs, or quality, excepting in the ſeveral courſes; the courſes themſelves being unequal to each other. (*Fig.* 11.)

MASONRY *filled up in the middle*, *Impletion*, alſo made of unhewn ſtone and by regular courſes, the middle being filled up with ſtones at random. (*Fig.* 12.)

Compound MASONRY, as being formed of all the reſt. Here the courſes are of hewn ſtone and the middle filled up with mortar and pebbles thrown in together. After this the ſtones of one courſe are bound to thoſe of another with cramp-irons faſtened with melted lead. (*Fig.* 13.)

All the kinds of maſonry now in uſe may be reduced to theſe five, viz. bound maſonry; that of brick work, where the bodies and projectures of the ſtones incloſe ſquare ſpaces or pannels, &c. ſet with bricks; that de moilon or ſmall work, where the courſes are equal, well ſquared, and their edges or beds well ruſticated; that where the courſes are unequal; and that filled up in the middle with little ſtones and mortar.

MASQUE, MASK, a cover for the face contrived with apertures for the eyes and mouth.

MASQUE, in architecture, certain hideous forms, or groteſque faces, &c. to adorn vacant places, as in freezes, pannels of doors, keys of arches, &c. particularly in grottos.

MASQUERADE, *Maſcarade*, perſons maſked or diſguiſed in odd and antique dreſſes for amuſement.

MASS, *Maſſa*, the matter of which any body conſiſts; and in this ſenſe is diſtinguiſhed from its bulk or volume, which is its expanſion in length, breadth, and thickneſs. The maſs of any body is rightly eſtimated by its weight; and the maſſes of two bodies of the ſame weight are in a reciprocal ratio of their bulks.

MASS, *Meſſe*, *Miſſa*, in a religious ſenſe, denotes the publick prayers in the Romiſh church at the celebration of the Euchariſt.

MASSES, in painting, thoſe parts of a picture which contain great lights or great ſhadows.

MASSETER, in anatomy, a muſcle that ſerves to move the lower jaw, by pulling it upwards. See JAW.

MASSIVE, ſomething heavy and ſolid, in oppoſition to tender and delicate.

MAST, the fruit of trees called glandiferous, as oak, cheſnut, &c.

MAST,

Mast, in navigation, a long and round piece of wood raiſed in veſſels for the yards and ſails to be faſtened to, in order to receive the wind neceſſary for navigation. See the article Ship.

In a large ſhip there is a main-maſt, fore-maſt, mizen-maſt, boltſprit; and in galleons a counter-mizen.

The maſts of ſhips generally conſiſt of three pieces, joined together lengthwiſe, viz. the lower-maſt, the top-maſt, and the top-gallant-maſt. The top-maſt ſtands at the head of the lower-maſt, and the top-gallant-maſt at the head of the top-maſt in the ſame manner, and either of the two latter can be occaſionally taken down; but the lower-maſt as it is ſettled on the keel of the ſhip, can only be removed by hoiſting it out or cutting it away.

A little below the head of the lower-maſt is fixed the frame of the top, which reſts upon the hounds of the maſt; through this frame the top-maſt is hoiſted, after which, the head of it paſſes through the cap, which is a block of wood with two holes in it, one of which reſts on the head of the lower-maſt, and the other ſerves as above to keep the top-maſt ſteady. When the top-maſt is thus hoiſted up to its utmoſt extent, and kept ſteady above by the cap, and below by the top-frame, a large bar of wood or iron is thruſt through a ſquare hole in the heel of it, cut for that purpoſe; and this bar extending acroſs the middle of the top-frame, the whole weight of the top-maſt reſts upon it; as does the top-gallant-maſt in the ſame manner at the head of the top-maſt.

As every maſt is compoſed of three pieces, it will be alſo neceſſary to inform our readers that all ſhips, properly ſo called, are furniſhed with three maſts, viz. the main-maſt, the fore-maſt, and mizen-maſt. Thoſe which have only two or one maſt, are not called ſhips by ſeamen, but vary their names according to their method of rigging. Of two maſts, there are ſnows, brigs, bilanders, ketches, buſſes, ſchooners, and hermaphrodites, among the Engliſh. Among the Spaniards and Italians, ſettees, barco-longas, ſeluccas, &c. Thoſe of one maſt are ſloops, tartans, bean-cods, ſhallops, &c.

In the Britiſh navy, maſts are proportioned to the extreme breadth of the ſhip from out to out.

Proportion for the length of maſts, anno 1745.

			Guns.
1000 : breadth in feet :;	748: 756: 753: 741: 740: 747: 760:	main-maſt in yards	100 90 80 70 & 60 50 44 24
1000 : main-maſt ::	895: 901:	fore-maſt	100, 90, 80, & all the reſt.
1000 : main-maſt ::	870 866	mizen-maſt	100, 90, 80 & all the reſt.
1000 : main-maſt ::	640 613	bowſprit	100, 90, 80, & all the reſt.
1000 : main-maſt ::	600. 605: 613:	main-top-maſt	100,90,80, 70,90,80, 40, 24.
1000 : main-top-maſt ::	900: 910:	fore-top-maſt	100, 90, 80, all the reſt.
1000 : main-top-maſt ::	710: 717:	miz. top-maſt	100, 90, 80, all the reſt.
1000 : main-top-maſt ::	480: 508:	main-top-gal. maſt	100, 90, 80, all the reſt.
1000 : fore-top-maſt ::	480: 505:	fore-top-gal. maſt	100, 90, 80, all the reſt.

The proportion for maſting ſhips in the merchants ſervice, is generally regulated by the judgment and experience of the commander. The main and fore-maſt in all ſhips down to 60 guns, one inch diameter to every yard in length. For 50 and 40 guns, twenty-ſeven twenty-eighths of an inch diameter to one yard in length. For 24 guns, twelve thirteenths of an inch in diameter to one yard in length. All top-maſts are nine-tenths of an inch in diameter to one yard in length. The fore-top-maſt as big as the main-top-maſt. The top-gallant-maſt, one inch to a yard. The mizen-maſt, fifteen twenty-ſeconds of an inch to one yard in length. The mizen-top-maſt, five-ſixths of an inch to one yard in length. The bowſprit, an inch and a half to one yard. The jib-boom, ſeven-eighths of an inch to a yard. See the article Bowsprit.

MASTER, *Magiſter*, in general, is a title of authority; as the grand maſter of Malta, the maſter of St. Lazarus, &c.

Master *of a Ship of War*, an officer who has the charge of navigating the ſhip from port to port, under the direction of the captain; the management and diſpoſition of the ſails, the conducting the ſhip in all extremities of danger, and directing her motions in the time of action, more particularly belongs to him; as alſo to ſuperintend the proviſions, and ſee that none are permitted to come aboard but ſuch as are wholeſome and ſweet: he is alſo to take care that they are ſafely ſtowed by his mates and quarter-maſters; theſe are alſo employed to ſuperintend the navigation when he is off the deck, and to aſſiſt wherever his duty is concerned.

Master *of a Merchant-ſhip*, the officer who commands and directs her courſe, manages her lading, and all other affairs.

MASTER *at Arms*, in the marine, an officer, whoſe buſineſs it is to confine and plant ſentries over the priſoners in a ſhip of war; to obſerve that all the lights and fire are put out when the evening gun fires, only ſuch as are allowed by proper authority, or which are under the inſpection of ſentries: he is alſo to attend the ſide when any boats come aboard, and ſearch carefully that no ſpiritous liquors are brought into the ſhip, but what are permitted by the commanding officer. He is likewiſe to teach the ſea-men the exerciſe of the ſmall arms, to which they generally have a great averſion; for this purpoſe, in large ſhips, the maſter at arms has ſeveral corporals under him to aſſiſt in his office, and relieve the ſentries and each other. See Corporal.

Master *Attendant*, in the king's dock-yards, an officer whoſe duty it is to obſerve that all the ſhips, which are laid up, or ſaid to be in ordinary, are properly moored, cleaned and kept in order; for which purpoſe he is often to viſit and examine them; he alſo attends the muſters in the dock-yard, to obſerve that all the men regiſtered on the books do their duty: he has likewiſe the charge of the moorings, which are fixed in the river or harbour where he reſides, and theſe he is always to keep in good repair, that they may be ready to moor the ſhips of war when neceſſary, which employment he muſt alſo ſee ſecurely performed: he removes the ſhips from one place to another in the harbour, and pilots them into, and out of, the docks, &c.

Master *of Arts*, is the firſt degree taken up in foreign univerſities, and for the moſt part in thoſe of Scotland; but the ſecond in Oxford and Cambridge; candidates not being admitted to it till they have ſtudied ſeven years in the univerſity. See Degree.

Masters *in Chancery*, in ordinary, of which there are twelve, the maſter of the rolls being chief, are uſually choſen out of the barriſters of the common law, and ſit in chancery, or at the rolls, as aſſiſtants to the lord chancellor and maſter of the rolls.

Master *of the Horſe*, a great officer of the crown, who orders all matters relating to the king's ſtables, races, breed of horſes; and commands the equerries and all the other officers and tradeſmen employed in the king's ſtables. His coaches, horſes, and attendants are the king's, and bear the king's arms and livery.

Master *of the Ordnance*, a great officer who has the chief command of the king's ordnance and artillery.

Master *of the Revels*, an officer who orders all things relating to the performance of plays, maſks, balls, &c. at court.

Master *of the Rolls*, a patent officer for life, who has the cuſtody of the rolls of parliament and patents which paſs the great ſeal, and of the records of chancery, as alſo commiſſions, deeds, recognizances, which being made of rolls of parchment, give riſe to the name.

MASTICH, *Marum*, in pharmacy, is a ſolid reſin brought to us in a ſmall quantity, in drops or tears as it naturally forms itſelf in exſudating from the tree, which remain detached and ſingle.

This tree is one of the arbores flore a fructu remoto bacciferæ of Ray. It is deſcribed by Caſpar Bauhine and the other botanical writers under the name of the lentiſcus vulgaris, or the common lentiſk-tree. It grows not only in the other iſlands of the Ægean ſea as well as in Chios, but alſo in France, Spain, and Italy; but it does not afford the reſin in any part of theſe countries

In

In Chios it flows ſpontaneouſly in no ſmall quantities, but the people always wound the trees alſo, to procure the largeſt quantities.

The people of Chios are ſo fond of maſtich, that they make it an ingredient even in their bread, by way of giving it a better flavour. They have ſome of it alſo continually in their mouths by way of maſtichatory. They ſay it cleans and faſtens the teeth, and gives the breath an agreeable ſmell. In medicine it is detergent, aſtringent, and ſtomachick. It is greatly recommended in inveterate coughs, and againſt ſpitting of blood. It ſtrengthens the ſtomach, aſſiſts digeſtion, and ſtops vomitings. It is alſo uſed externally in plaiſters to the region of the ſtomach and inteſtines, and is ſaid to ſtop vomitings and purgings by that means. It is an ingredient in many of the old compoſitions. Jewellers mix maſtich with turpentine and black ivory, and lay it under their diamonds to give them a luſtre.

MASTICATION, *Maſticatio*, denotes the action of chewing the aliments. By this our food is agitated between the teeth, by means of the motion of the jaws, tongue, and lips, whereby it is comminuted, impregnated with ſaliva, and ſo fitted for deglutition and a more eaſy digeſtion in the ſtomach. The ſaliva diſſolves the ſalts hid in the parts of the food, ſo that it has the beginning of its digeſtion therefrom, and its concluſion from the ferment in the ſtomach.

MASTICATORY, *Maſticatorium*, in medicine, an apophlegmatiſm in a ſolid form.

MATCH, a kind of rope ſlightly twiſted, and prepared to retain fire for the uſes of artillery, mines, fireworks, &c. It is made of hempen tow, ſpun on the wheel like cord, but very ſlack; and is compoſed of three twiſts, which are afterwards again covered with tow, ſo that the twiſts do not appear: laſtly, it is boiled in the lees of old wines. This, when once lighted at the end, burns on gradually and regularly, without ever going out, till the whole be conſumed: the hardeſt and drieſt match is generally the beſt.

MATCHING, in the wine trade, the preparing veſſels to preſerve wines and other liquors, without their growing ſour or vapid. The method of doing it, as directed by Dr. Shaw, is as follows: melt brimſtone in an iron ladle, and when thoroughly melted, dip into it ſlips of coarſe linen cloth; take theſe out, and let them cool: this the wine-coopers call a match; take one of theſe matches, ſet one end of it on fire, and put it into the bung-hole of a caſk; ſtop it looſely, and thus ſuffer the match to burn nearly out: then drive in the bung tight, and ſet the caſk aſide for an hour or two. At the end of this time examine the caſk, and you will find that the ſulphur has communicated a violent pungent and ſuffocating ſcent to the caſk, with a conſiderable degree of acidity, which is the gas and acid ſpirit of the ſulphur. The caſk may after this be filled with a ſmall wine, which has ſcarce done its fermentation, and bunging it down tight, it will be kept good, and will ſoon clarify: this is a common and very uſeful method, for many poor wines could ſcarce be kept potable, even a few months, without it.

MATERIA Subtilis, denotes a fine ſubtile matter which the Carteſians ſuppoſe to pervade and penetrate freely the pores of all bodies, to fill up all their pores ſo as not to leave the leaſt vacuity or interſtice between them; they had recourſe to this machine to ſupport the doctrine of an abſolute plenum, and to make it conſiſtent with the phænomenon of motion, &c. See Cartesians, Plenum and Vacuum.

Materia Chymica, a term uſed by authors to expreſs ſuch bodies as are the peculiar objects of chymical experiments.

Materia Medica, comprehends all the ſubſtances either uſed in medicine in their natural ſtate, or which afford preparations that are ſo; theſe belong partly to the animal, partly to the vegetable, and partly to the foſſil kingdom.

The preparations and virtues of all which are delivered under their reſpective articles, but in as conciſe and ſcrupulous a manner as we poſſibly could; ſince we cannot but remark, with the great Boyle, that it is too frequent in writers on the materia medica, to give us rather encomiums than impartial accounts of the ſimples they treat of. However, the ſame great author prefers the uſe of approved ſimples to that of compound medicines, becauſe one or other of the ingredients may have different operations from thoſe intended by the phyſician: and he adds, that he had ſo many unwelcome proofs of this himſelf, that he thought it his duty to caution others againſt the like inconvenience.

MATHEMATICKS, from μάθησις, originally ſignified any diſcipline of learning; but, at preſent, denotes that ſcience which teaches, or contemplates, whatever is capable of being numbered or meaſured, in ſo far as it is computable or meaſurable, and, accordingly, is ſubdivided into arithmetick, which has numbers for its object, and geometry, which treats of magnitude.

Mathematicks are commonly diſtinguiſhed into pure and ſpeculative, which conſider quantity abſtractedly; and mixed, which treat of magnitude as ſubſiſting in material bodies, and conſequently are interwoven every where with phyſical conſiderations.

Mixed mathematicks are very comprehenſive; ſince to them may be referred aſtronomy, opticks, geography, hydography, hydroſtaticks, mechanicks, fortification, navigation, &c.

Pure mathematicks have one peculiar advantage, that they occaſion no diſputes among wrangling diſputants, as in other branches of knowledge; and the reaſon is, becauſe the definitions of the terms are premiſed, and every body that reads a propoſition has the ſame idea of every part of it. Hence it is eaſy to put an end to all mathematical controverſies, by ſhewing, either that our adverſary has not ſtuck to his definitions, or has not laid down true premiſes, or elſe that he has drawn falſe concluſions from true principles; and in caſe we are able to do neither of theſe, we muſt acknowledge the truth of what he has proved.

It is true, that in mixed mathematicks, where we reaſon mathematically upon phyſical ſubjects, we cannot give ſuch juſt definitions as the geometricians: we muſt therefore reſt content with deſcriptions, and they will be of the ſame uſe as definitions, provided we are conſiſtent with ourſelves, and always mean the ſame thing by thoſe terms we have once explained.

Dr. Barrow gives a moſt elegant deſcription of the excellence and uſefulneſs of mathematical knowledge, in his inaugural oration, upon being appointed profeſſor of mathematicks at Cambridge.

The mathematicks, he obſerves, effectually exerciſe, not vainly delude, nor vexatiouſly torment ſtudious minds with obſcure ſubtilties; but plainly demonſtrate every thing within their reach, draw certain concluſions, inſtruct by profitable rules, and unfold pleaſant queſtions. Theſe diſciplines likewiſe inure, and corroborate the mind to a conſtant diligence in ſtudy; they wholly deliver us from a credulous ſimplicity, moſt ſtrongly fortify us againſt the vanity of ſcepticiſm, effectually reſtrain us from a raſh preſumption, moſt eaſily incline us to a due aſſent, perfectly ſubject us to the government of right reaſon. While the mind is abſtracted and elevated from ſenſible matter, diſtinctly views pure forms, conceives the beauty of ideas, and inveſtigates the harmony of proportions; the manners themſelves are inſenſibly corrected and improved, the affections compoſed and rectified, the fancy calmed and ſettled, and the underſtanding raiſed and excited to more divine contemplations.

MATRICULA, a regiſter kept of the admiſſion of officers and perſons entered into any body or ſociety, of which a liſt is made.

MATRIX, *Uterus*, the womb, in anatomy, that part of the female of any kind, where the fœtus is conceived and nouriſhed till the time of its delivery.

Matrix alſo denotes a place proper for the generation of vegetables, minerals, and metals.

Matrix, in letter-foundery. See Foundery.

MATRONALIA, a feſtival of the ancient Roman matrons, from whom it had its name. It was celebrated on the calends of March, in honour of the god Mars; and was to the Roman ladies what the feſtival of the Saturnalia was to their huſbands; for at this time they ſerved their women ſlaves at table, and received preſents from their huſbands.

MATROSSES are ſoldiers in the train of artillery, who are next to gunners, and aſſiſt them in loading, firing, and ſpunging the great guns. They carry firelocks, and march along with the ſtore waggons, both as a guard,

a guard, and to give their aſſiſtance in caſe a waggon ſhould break down.

MATTER, *Materia*, in phyſiology, whatever is extended and capable of making reſiſtance: hence, becauſe all bodies, whether ſolid or fluid, are extended, and do reſiſt, we conclude that they are material, or made up of matter.

MATTHEW, *or Goſpel of St.* MATTHEW, one of the four goſpels, or evangelical books of the New Teſtament.

MAXILLA, the jaws, or thoſe parts of an animal body in which the teeth are ſet.

MAXIM, the ſame with axiom. See AXIOM.

MAXIMUM, in mathematicks, denotes the greateſt quantity attainable in any given caſe.

If a quantity conceived to be generated by motion, increaſes, or decreaſes, till it arrives at a certain magnitude or poſition, and then, on the contrary, grows leſs or greater, and it be required to determine the ſaid magnitude or poſition, the queſtion is called a problem de maximis & minimis. The rule therefore to determine any flowing quantity in any equation propoſed, to an extreme value, is having put the equation into fluxions, let the fluxion of that quantity (whoſe extreme value is ſought) be ſuppoſed equal to nothing; by which means all thoſe members of the equation in which it is found, will vaniſh, and the remaining ones will give the determination of the maximum or minimum required. Thus, ſuppoſe it were required to divide a given right line into two ſuch parts, that their product, or rectangle, may be the greateſt poſſible. This is the caſe, when the line is biſſected, or divided into equal parts.

In any mechanical engine, the proportion of the power to the weight, when they balance each other, is found by ſuppoſing the engine to move, and reducing their velocities to the reſpective directions in which they act, for the inverſe ratio of theſe velocities is that of the power to the weight according to the general principle of mechanicks. But it is of uſe to determine likewiſe the proportion they ought to bear to each other, that when the power prevails, and the engine is in motion, it may produce the greateſt effect in a given time. When the power prevails, the weight moves at firſt with an accelerated motion; and when the velocity of the power is invariable, its action upon the weight decreaſes, while the velocity of the weight increaſes. Thus the action of a ſtream of water or air upon a wheel, is to be eſtimated from the exceſs of the velocity of the fluid above the velocity of the part of the engine which it ſtrikes, or from their relative velocity only. The motion of the engine ceaſes to be accelerated when this relative velocity is ſo far diminiſhed, that the action of the power becomes equal to the reſiſtance of the engine ariſing from the gravity of the matter that is elevated by it, and from friction; for when theſe balance each other, the engine proceeds with the uniform motion it has acquired.

MAY, *Maius*, the fifth month in the year, beginning at January. In this month the ſun enters Gemini, and plants begin to flower.

MAYL, in falconry, denotes to pinion the wings of a hawk.

MAYOR, the chief magiſtrate in the cities and moſt of the corporation towns in England, choſen annually out of the number of the aldermen.

The mayor of a place is the king's lieutenant, and with the aldermen and common-council has a power of making by-laws for the better government of a place. He can determine matters judicially and mitigate the rigour of the law.

The bailiffs of London were changed into mayors by Richard I. A. D. 1189.

MAYOR'*s Courts*. The higheſt and moſt ancient is the court of huſtings deſtined to ſecure the rights and cuſtoms of the city; the ſecond is a court of requeſt or conſcience, meddling with nothing above 40s. where the oath of the creditor himſelf is accepted: the third is that of the lord-mayor and aldermen, where alſo the ſheriffs ſit; to which may be added two courts of ſheriffs and that of the city orphans, whereof the mayor and aldermen have the cuſtody. Alſo, the court of common-council, conſiſting of two houſes; the one for the lord-mayor and aldermen, and the other for the commoners, where by-laws are made which bind the citizens. Alſo the chamberlain's court, where every thing relating to the revenues of the city, as alſo the affairs of apprentices, ſervants, &c. are tranſacted. Laſtly, to the lord-mayor belong the courts of coroner and eſcheator; another court for the conſervation of the river of Thames; another of gaol delivery held at the Old Bailey, for the trial of criminals, whereof the lord-mayor is himſelf the chief judge.

There are other courts called wardmotes, or meetings of the wards and courts of halymote, or aſſemblies of the ſeveral fraternities and guilds.

MAYZ, a kind of Indian corn, much of the ſame temperament with wheat, and of which they make bread.

MAY-WEED, a wild ſpecies of chamomile, a trailing perennial plant, which puts out roots from its branches as they lie on the ground. By this means, and by ſcattering its ſeeds long before the corn is ripe, it ſpreads and multiplies greatly. It flowers in May, and thence has acquired the name of May-weed.

The means of extirpating it are, ſummer fallows, repeated good harrowing, and burning the collected roots, as before directed, in ſimilar caſes, or, which will be found ſtill more effectual, the frequent hoeings practiſed in the New Huſbandry. What eſcapes theſe clearings ſhould be very carefully pulled up by hand; for the common weeding-hook will not go deep enough to take out the whole of the long ſlender tap root of this plant, of which every remaining bit that has a knot in it will produce new ſhoots. Nor ought the farmer to regret this ſmall additional expence, to get rid of one of the moſt fatal enemies his corn can have. Mr. Liſle aſſures us, that as good a crop of wheat as one would wiſh to ſee all the winter time was, to his knowledge, ſo deſtroyed by the coming up of May-weeds and poppies in the ſpring and ſummer, that it did not at laſt yield ſo much as the ſeed.

MEAD, a liquor made of honey, and held in great eſtimation by moſt of the northern nations, but perhaps not eſteemed here ſo much as it might deſerve, if due care was taken to prepare it properly. All the writers who have hitherto treated of this ſubject, have given into a capital error with regard to the ſtrength of this liquor, by directing too great a proportion of honey to be diſſolved in the water. The uſual practice of making it ſo ſtrong to bear an egg, is very wrong. The liquor is thereby rendered a mere ſtum, and this bad quality is ſtill increaſed by the long boiling generally practiſed. It is ſcarcely poſſible to procure honey ſo pure, but that ſome bee-bread, wax, or other ſubſtance, is mixed with it; and this cannot be perfectly ſeparated from it, but by boiling. On this account the boiling of mead ſeems indiſputably neceſſary. In order the more effectually to ſeparate theſe impurities from the liquor, it will be adviſeable to mix ſome whites of eggs with it before it is put on the fire, and it will be particularly neceſſary to ſkim off the thick ſcum that riſes, the moment the liquor begins to boil; and this muſt be attentively continued ſo long as it boils. The only intention of boiling here being to ſeparate the impurities, and to make a perfect union of the water and the honey, both which purpoſes are very ſoon obtained, it evidently appears, that the boiling need be of but very ſhort duration. This becomes here more particularly neceſſary, becauſe the liquor will be the leſs diſpoſed to ferment kindly, the longer the boiling has been continued. It is perhaps owing to the ſingle article of long boiling, that mead has hitherto lain under ſo great diſcredit; becauſe it then never fermented ſufficiently to take off its luſcious ſweetneſs; whereas, had it undergone a due fermentation, that ſweetneſs would have gone off, and the mead would have attained a fine racy flavour.

Some notable houſewives have added hops to their mead. This helps to take off its ſweetneſs, and, as the bitterneſs of the hop goes off, gives it a pleaſant flavour. A ferment is here, as in all liquors that are boiled, generally wanted to bring on a perfect fermentation: but as the leaſt taint in the ferment is communicated to the whole liquor, particular care ſhould be taken that it be very ſweet and good. Mead, judiciouſly managed on theſe principles, will keep for years, and be improved by age. The racking, fining, &c. of this liquor, are the ſame as thoſe of other white wines.

MEADOW, in its general ſignification, means paſture,

ture, or grafs-land, annually mown for hay; but is more particularly applied to lands that are fo low as to be too moift for cattle to graze upon them in winter, without fpoiling the fward. Too much or too little water is almoft equally prejudicial to meadows, but the beft land for meadows is a rich foil, that has a moift bottom, efpecially where a fmall brook may be brought over it, and where there is fuch a defcent, that the water will not lodge: thefe are better than thofe by great rivers, where the crops are often loft. Thofe that may be overflowed at pleafure, are called water meadows; thefe fhould never be overflowed till the end of March, except once or twice in winter, when there are fuch floods as bring down a great deal of foil from the upper-lands, and if the feafon fhould prove dry, it will be of great fervice to the grafs, if the meadows are overflowed again; but then the cattle fhould not be turned in till the fward is dry enough to bear their weight. Miller recommends the weeding of meadows in April and October, with a fpaddle, and rolling them with a heavy roller in fpring and autumn. See Pasture, Grass and Hay.

MEAN, the middle between two extreams.

Mean *Motion*, Mean *Diftance*, &c. of a planet, that which as far exceeds the leaft diftance or motion, as it is exceeded by the greateft.

Mean, in law, refers either to time or dignity. In the firft fenfe, we fay his action was mean betwixt the diffeifn and recovery, that is, in the interim. In the fecond fenfe, a lord mean, or mefne, is a lord of a manor, who has tenants that hold of him, yet he himfelf holds of the king.

MEASLES, *Morbilli*, in phyfick, a cutaneous difeafe attended with eruptions, not tending to fuppuration, and a fever.

This difeafe, fays Sydenham, arifes in January, and increafes daily till the approach of the vernal equinox; after which time it abates in the fame gradual manner and difappears in July. It principally attacks children. As the meafles, in their nature, nearly refemble the fmall pox, fo do they likewife agree pretty much therewith in the method of cure which they require.

"I confined the patient to a bed for only two or three days after the eruption, that the blood might gently breathe out the inflamed and noxious particles, that are eafily feparable through the pores; and allowed no more cloaths nor fire than he accuftomed himfelf to, when in health. I forbad all flefh meats, and permitted water gruel, barley broth, and the like, and fometimes a roafted apple for diet; and, for drink, either fmall beer or milk boiled with thrice its quantity of water. To relieve the cough, which almoft always attends this difeafe, I ordered a draught of fome pectoral decoction between whiles, with a proper linctus. But I principally obferved to give diacodium every night throughout the diftemper.

But if by ufing cardiacks, and too hot a regimen, after the ceffation of the difeafe, the patient's life be endangered by the violent fever, difficulty of breathing, &c. I have with great fuccefs ordered even the tendereft infants to be blooded in the arm, in fuch quantity as the age and ftrength indicated. Sometimes alfo, when the difeafe has been urgent, I have not been afraid to repeat the operation. Bleeding alfo cures the loofenefs which fucceeds the meafles."

MEASURE, *Menfura*, in geometry, denotes any quantity affumed as one, or unity, to which the ratio of other homogeneous or fimilar quantities is expreffed. This definition is fomewhat more agreeable to practice than that of Euclid, who defines meafure, a quantity which being repeated any number of times, becomes equal to another. This latter definition anfwers only to the idea of an arithmetical meafure, or quota-part.

Measure *of an Angle*, is an arch defcribed from the vertex in any place between its legs. Hence angles are diftinguifhed by the ratio of the arches, defcribed from the vertex between the legs to the peripheries. Angles then are diftinguifhed by thofe arches; and the arches are diftinguifhed by their ratio to the periphery: thus an angle is faid to be fo many degrees as there are in the faid arch. See Angle.

Measure *of a Figure*, or plane furface, is a fquare whofe fide is one inch, foot, yard, or fome other determinate length. Among geometricians, it is ufually a rod called a fquare rod. divided into 10 fquare feet, and the fquare feet into fquare digits, and thofe again into fquare lines, &c.

Measure *of a Line*, any right line taken at pleafure, and confidered as unity. The modern geometricians ufe a decempeda, or perch divided into ten equal parts, called feet; the feet they fubdivide into ten digits, and the digit into ten lines, &c.

Measure *of the Mafs*, or *Quantity of Matter*, in mechanicks, is its weight; it being apparent that all the matter which coheres and moves with a body, gravitates with it, and it being found by experiment, that the gravities of homogeneal bodies are in proportion to their bulks; hence, while the mafs continues the fame, the weight will be the fame, whatever figure it put on: by which is meant its abfolute weight, for as to its fpecifick, that varies as the quantity of the furface varies. See Gravity and Moment.

Measure *of a Number*, in arithmetick, fuch a number as divides another without leaving any fraction: thus 9 is a meafure of 27.

Measure *of a Solid*, is a cube whofe fide is one inch, foot, yard, or any other determinate length. In geometry, it is a cubick perch, divided into cubick feet, digits, &c. hence cubick meafures, or meafures of capacity. See Sphere, Cube, &c.

Measure *of Velocity*, in mechanicks, the fpace paffed over by a moving body in a given time. To meafure a velocity therefore, the fpace muft be divided into as many equal parts as the time is conceived to be divided into; the quantity of fpace anfwering to fuch an article of time is the meafure of the velocity. See Velocity.

Measure, in a legal and commercial fenfe, denotes a certain quantity or proportion of any thing bought, fold, valued, or the like. Meafures are then various, according to the various kinds and dimenfions of the things meafured. Hence arife lineal or longitudinal meafures, for lines or lengths; fquare meafures, for areas or fuperficies; and folid or cubick meafures, for bodies and their capacities. All which again are very different in different countries, and in different ages, and even many of them for different commodities. Whence arife other divifions of ancient and modern meafures, domeftick and foreign ones, dry meafures, liquid meafures, &c.

Long Measures, or Measures *of Application*. The Englifh ftandard long meafure for commerce, or that whereby the quantities of things are ordinarily eftimated in the way of trade, is the yard, containing three Englifh feet. Its divifions are the foot, fpan, palm, inch, and barley corn; its multiples the pace, fathom, pole, furlong, and mile. The proportions thefe feverally bear to each other, are expreffed in the following table.

English Measures of Length.

Barley-corns											
3	Inch										
9	3	Palm.									
27	9	3	Span								
36	12	4	1⅓	Foot							
54	18	6	2	1	Cubit						
108	36	12	4	3	2	Yard					
180	60	20	6⅔	5	3⅓	1	Pace				
216	72	24	8	6	4	2	1⅕	Fathom			
594	198	66	22	16½	11	5½	3⅓	2¾	Pole		
23760	7920	2640	880	660	440	220	132	110	40	Furlong	
190080	63360	21120	7040	5280	3520	1760	1056	880	320	8	Mile.

Scripture

Scripture-MEASURES of Length reduced to English.

								Eng. feet.	inch. Dec.
Digit								0	0.912
4	Palm							0	3.648
12	3	Span						0	10.944
24	6	2	Cubit					1	9.888
96	24	8	4	Fathom				7	3.552
144	36	12	6	1$\frac{1}{2}$	Ezechiel's reed			10	11.328
192	48	16	8	2	1$\frac{1}{3}$	Arabian pole		14	7.104
1920	480	160	80	20	13$\frac{1}{3}$	10	Schœnus, or meas. line	145	11.04

The Longer Scripture-MEASURES.

						Eng. miles.	paces.	feet.
Cubit						0	0	1.824
400	Stadium					0	145	4.6
2000	5	Sab. day's journey				0	729	3.000
4000	10	2	Eastern mile			1	403	1.000
12000	30	6	3	Parasang		4	153	3.000
96000	240	48	24	8	a day's journey	33	172	4.000

A Table of the MEASURES of Length of the principal Places in Europe, compared with the English Yard.

		Eng. yard.
100	Aunes or ells of England equal to	125
100	of Holland or Amsterdam	75
100	of Brabant or Antwerp	76
100	of France	128$\frac{1}{4}$
100	of Hamburgh, Francfort, &c.	62$\frac{1}{2}$
100	of Breslau	60
100	of Dantzick	66$\frac{3}{4}$
100	of Bergen and Drontheim	68$\frac{1}{4}$
100	of Sweden or Stockholm	65$\frac{3}{4}$
100	of St. Gall, for linens	87$\frac{1}{2}$
100	of ditto, cloths	67
100	of Geneva	124$\frac{3}{4}$
100	Canes of Marseilles and Montpelier	214$\frac{1}{2}$
100	of Toulouse and High Languedock	200
100	of Genoa, of 9 palms	245$\frac{1}{4}$
100	of Rome	227$\frac{1}{4}$
100	Varas of Spain	93$\frac{3}{4}$
100	of Portugal	123
100	Cavidos of Portugal	75
102	Brasses of Venice	73$\frac{1}{2}$
100	of Bergamo, &c.	71$\frac{1}{4}$
100	of Florence and Leghorn	64
100	of Milan	58$\frac{1}{2}$

N. B. The aunes or ells of Amsterdam, Haerlem, Leyden, the Hague, Rotterdam, and other cities of Holland, as also that of Nuremberg, being all equal, are comprehended under that of Amsterdam; as those of Osnabrug are under those of France; and those of Bern and Basil are equal to those of Hamburg, Francfort, and Leipsick.

For the subdivisions and multiples of each of these measures of length, see AUNE, &c.

For the proportion of the feet of the principal nations in Europe, compared with the English foot, see FOOT.

Square, or *Superficial* MEASURES. English square or superficial measures are raised from the yard of 36 inches multiplied into itself, and thus producing 1296 square inches in the square yard: the divisions of this are square feet and inches; and the multiples, poles, roods, and acres, as in the following table.

English Square-MEASURES.

Inches						
144	Feet					
1296	9	Yards				
3600	25	2	Paces			
39204	272$\frac{1}{4}$	30$\frac{1}{4}$	10.89	Poles		
1568160	10890	1210	435.6	40	Rood	
6272640	43560	4840	1743.6	160	4	Acre

Grecian square-measures were the plethron, or acre, by some said to contain 1444, by others 10000 square feet; and the aroura, the half of the plethron. The aroura of the Egyptians was the square of 100 cubits.

Cubical MEASURES, or *Measures of Capacity for Liquids*. —The English measures were originally raised from troy-weight; it being enacted by several statutes that eight pounds troy of wheat, gathered from the middle of the ear, and well dried, should weigh a gallon of wine-measure, the divisions and multiples whereof were to form the other measures; at the same time it was also ordered, that there should be but one liquid measure in the kingdom: yet custom has prevailed, and there having been introduced a new weight, viz. the avoirdupois, we have now a second standard-gallon adjusted thereto, and therefore exceeding the former in the proportion of the avoirdupois weight to troy weight. From this latter standard are raised two several measures, the one for ale, the other for beer.

The sealed gallon at Guildhall, which is the standard for wines, spirits, oils, &c. is supposed to contain 231 cubick inches; and on this supposition the other measures raised therefrom, will contain as in the following table: yet by actual experiment, made in 1688, before the lord-mayor and the commissioners of excise, this gallon was found to contain only 224 cubick inches: it was however agreed to continue the common supposed contents of 231 cubick inches; so that all computations stand on their old footing. Hence as 12 is to 231, so is 14$\frac{12}{20}$ to 281$\frac{1}{2}$ the cubick inches in the ale-gallon: but in effect the ale-quart contains 70$\frac{1}{2}$ cubick inches, on which principle the ale and beer-gallon will be 282 cubick inches. The several divisions and multiples of these measures, and their proportions, are exhibited in the following tables.

English MEASURE of Capacity for Liquids.
Wine-measure.

Solid inches								
28$\frac{7}{8}$	Pint							
231	8	Gallon						
4158	144	18	Rundlet					
7276$\frac{1}{2}$	252	31$\frac{1}{2}$	1$\frac{3}{4}$	Barrel				
9702	336	42	2$\frac{1}{3}$	1$\frac{1}{3}$	Tierce			
14553	504	63	3$\frac{1}{2}$	2	1$\frac{1}{2}$	Hogshead		
19279	672	84	4$\frac{2}{3}$	2$\frac{2}{3}$	2	1$\frac{1}{3}$	Puncheon	
29106	1008	126	7	4	3	2	1$\frac{1}{2}$	Butt
58212	2016	252	14	8	6	4	3	2 Tun.

Ale-Measure.

Pints				
8	Gallon			
64	8	Firkin		
128	16	2	Kilderkin	
256	32	4	2	Barrel
384	48	6	3	1$\frac{1}{2}$ Hogshead

Beer-Measure.

Pints				
8	Gallon			
72	9	Firkin		
144	18	2	Kilderkin	
288	36	4	2	Barrel
533	54	6	3	1$\frac{1}{2}$ Hogshead.

Jewish MEASURES of Capacity for Liquids, reduced to English Wine-measure.

						Gal.	pints.	Sol. inch.
Caph						0	0$\frac{5}{8}$	0.177
1$\frac{1}{3}$	Log					0	0$\frac{5}{6}$	0.211
5$\frac{1}{3}$	4	Cab				0	3$\frac{1}{3}$	0.844
16	12	3	Hin			1	2	2.533
32	24	6	2	Seah		2	4	5.067
96	72	18	6	3	Bath, or Epha	7	4	15.2
960	720	180	60	30	10 Coron or Chomer	75	5	7.625

In the modern liquid-measures of foreign nations, it is to be observed, that their several vessels for wine, vinegar, &c. have also various denominations, according to their different sizes, and the places wherein they are used. The Woeders of Germany, for holding Rhenish and Moselle wines, are different in their gauges; some containing 14 aumes of Amsterdam measure, and others more or less. The aume is reckoned at Amsterdam for 8 steckans or 20 verges, or for $\frac{1}{6}$ of a tun of 2 pipes; or 4 barrels of France or Bourdeaux, which $\frac{1}{2}$ at this latter place is called tiercon, because 3 of them make a pipe or 2 barrels, and 6 the said tun. The steckan is 16 mingles, or 32 pints: and the verge is, in respect of the said Rhenish and Moselle and some other sorts of wine, of 6

 mingles;

mingles; but in meaſuring brandy, it conſiſts of 6 $\frac{1}{8}$ mingles. The aume is divided into 4 anckers, and the ancker into 2 ſteckans, or 32 mingles. The ancker is taken ſometimes for $\frac{1}{24}$ of a ton, or 4 barrels, on which footing the Bourdeaux barrel ought to contain at Amſterdam (when the caſk is made according to the juſt gauge) 12$\frac{1}{2}$ ſteckans, or 200 mingles, wine and lees; or 12 ſteckans, or 192 mingles, racked wine; ſo that the Bourdeaux ton of wine contains 50 ſteckans, or 800 mingles, wine and lees; and 48 ſteckans, or 768 mingles of pure wine. The barrels or poinçons of Nantes and other places on the river Loire, contain only 12 ſteckans Amſterdam-meaſure. The wine-ton of Rochelle, Cognac, Charente, and the Iſle of Rhé, differs very little from the ton of Bourdeaux, and conſequently from the barrels and pipes. A ton of wine of Chaloſſe, Bayonne, and the neighbouring places, is reckoned 60 ſteckans, and the barrel 15, Amſterdam-meaſure.

The muid of Paris contains 150 quarts, or 300 pints, wine and lee; or 280 pints clear wine; of which muids 3 make a ton, and the fractions are,

The muid	containing	36 ſetiers
The ſetier		4 quarts
The quart		2 pints
The pint		2 chopins
The chopin		2 demi-ſetiers
The demi-ſetier		2 poiſſons.

The muid is alſo compoſed of pipes, or poinçons, quarteaux, queves, and demiqueves: theſe poinçons of Paris and Orleans contain about 15 ſteckans Amſterdam-meaſure, and ought to weigh with the caſk 666 ℔. a little more or leſs. In Provence they reckon by milleroles, and the millerole of Toulon contains 66 Paris-pints, or 100 pints of Amſterdam, nearly; and the Paris-pint is nearly equal to the Engliſh wine-quart.

The butts or pipes from Cadiz, Malaga, Alicant, Benecarlo, Saloe, and Mataro, and from the Canaries, from Liſbon, Oporto, and Fayal, are very different in their gauges, though in affreightments they are all reckoned two to the ton.

Vinegar is meaſured in the ſame manner as wine; but the meaſures for brandies are different: theſe ſpirits from France, Spain, Portugal, &c. are generally ſhipped in large caſks called pipes, butts, and pieces, according to the places from whence they are exported, &c. In France, brandy is ſhipped in caſks called pieces at Bourdeaux, and pipes at Rochelle, Cognack, the iſle of Rhé, and other neighbouring places, which contain ſome more and ſome leſs: even from 60 to 90 Amſterdam-verges or veertels, according to the capacity of the veſſels, and the places they come from, which being reduced into barrels, will ſtand as follows, viz.

At Rochelle, Cognack, the Iſle of Rhé, and the country of Aunis —	27 veertels	per barrel.
At Nants, and ſeveral places of Bretagne and Anjou — —	29 veertels	
At Bourdeaux, and different parts of Guienne — —	32 verges	
At Amſterdam, and other cities of Holland — — —	30 veertels	
At Hamburgh and Lubeck —	30 verges	
At Embden — —	27 verges	

In Provence and Languedock, brandy is ſold by the quintal, the caſks included; and at Bruges, in Flanders, the verges are called ſeſters of 16 ſtops each, and the ſpirit is ſold at ſo much per ſtop.

Olive-oil is alſo ſhipped in caſks of various ſizes, according to the cuſtom of the places where it is embarked, and the conveniency of ſtowage. In England it is ſold by the ton of 236 gallons; and at Amſterdam by the ton of 717 mingles, or 1434 pints. In Provence it is ſold by milleroles of 66 Paris-pints: from Spain and Portugal it is brought in pipes, or butts, of different gauges; at the firſt place it is ſold by roves, whereof 40 go to the butt; and at the latter place by almoudas, whereof 26 make a pipe. Train-oil is ſold in England by the ton, at Amſterdam by the barrel.

Measures *of Capacity for Things dry.* Engliſh dry or corn-meaſures are raiſed from the Wincheſter-gallon, which contains 272$\frac{1}{4}$ ſolid inches, and ought to hold of pure running water 9 pounds 13 ounces. This ſeems to ſtand on the foot of the old wine-gallon of 224 cubick inches, 12 being to 14$\frac{12}{20}$ as 224 to 272$\frac{1}{4}$; but by an act of parliament made in 1697 it is decreed, that a round buſhel, 18$\frac{1}{2}$ inches wide, and 8 deep, is a legal Wincheſter-buſhel. Now ſuch a buſhel will only hold 2150.42 cubick inches, conſequently the gallon will hold 268.8 cubick inches, the diviſions and multiples whereof are in the following table:

English Dry or Corn Measure.

Solid inches					
33.6	Pint				
268.8	8	Gallon			
537.6	16	2	Peck		
2150.4	64	8	4	Buſhels	
17203.2	512	64	32	8	Quarter.

Scripture Measures of Capacity for Things dry, reduced to Engliſh Corn-meaſure.

							Peck	Gal.	Pint.	ſolid inch. dec.
Gachal	—	—					0	0	0 $\frac{1}{7}$	0.031
20	Cab	—	—				0	0	2 $\frac{5}{6}$	0.073
36	1 $\frac{4}{5}$	Gomer	—	—			0	0	5 $\frac{1}{10}$	1.211
120	6	3 $\frac{1}{3}$	Seah				1	0	1	4.036
360	18	10	3	Epha	—		3	0	3	12.107
1800	90	50	15	5	Leteeh —		16	0	0	26.500
3600	180	100	30	10		Chomer, or Coron	32	0	1	18.969

In the ſeveral parts of Europe, ſalt, which is a more ſtaple and current commodity than any other, is bought and ſold by different meaſures, according to the ſeveral places of its diſpatch: at Amſterdam it is ſold by the cent of 404 meaſures, or ſcheppels, which cent is reckoned to be ſeven laſts, or 14 tons, and the laſt is to weigh 4000 ℔. the ſeven laſts making 28000 ℔. called the cent of ſalt, which alſo contains 208 ſacks; though ſome of this commodity is much heavier than others. In the cities of France, ſalt is ſold by the muid, whoſe ſize varies according to the different places of its manufacture and diſpatch. At Paris this meaſure is reckoned to contain 12 ſetiers, or 48 minots, which minot is alſo divided into other meaſures. The cent of ſalt from Marans, Brouage, Sude, and the Iſle of Rhé, contain 28 ſtricken muids, and each muid 24 boiſeaux, which yields at Amſterdam 11$\frac{1}{2}$ laſts, or 23 tons, more or leſs. In Copenhagen, the ſaid cent renders only 9$\frac{1}{2}$ laſts, the laſt being reckoned here equal to 18 tons, and 50 laſts to correſpond with 52 of Coningſberg, at which place the cent produces about 10 laſts, or 40,000 ℔. At Riga the ſaid cent yields the ſame meaſure as at Coningſberg, and about 6$\frac{1}{2}$ laſts of Riga, make the great cent of Amſterdam. The ſaid French cent produces at Dantzick from 11$\frac{1}{2}$ to 12 laſts, of which laſts from 7$\frac{1}{4}$ to 7$\frac{1}{2}$, make likewiſe the great cent of Amſterdam. At Stetin in Pomerania, the French cent yielded 10 laſts, making 40,000 meaſure and weight of the ſaid place. In Portugal it is bought by the muid, of which four make a laſt, and ſeven the cent of Amſterdam. At Alamat and Ivica it is ſold by the modin, which weighs from 27$\frac{1}{2}$ to 28 hundred weight Engliſh.

Measure *of Wood for Firing*, is the cord, being four feet high, as many broad, and eight long; it is divided into two half cords.

The Measure *for Horſes*, is the hand, which by ſtatute contains four inches.

Measure, denotes the cadence and time obſerved in poetry, dancing, and muſick, to render them regular and agreeable.

The different meaſures or metres in the Latin, &c. poetry, are the different manners of combining the long and ſhort ſyllables. Thus hexameter, pentameter, iambick, ſapphick, &c. verſes conſiſt of different meaſures.

In Engliſh poetry, the meaſures are extremely various and arbitrary: the moſt uſual are the heroick, which generally conſiſts of five long and five ſhort ſyllables; verſes of four feet, and of three feet and a cæſure of ſingle ſyllables.

The ancients, by variouſly combining and tranſpoſing their quantities, made a vaſt variety of different meaſures. Of feet of two ſyllables they formed a ſpondee conſiſting of two long ſyllables; a pyrrich of two ſhort; a trochee,

of a long and a ſhort; and an iambick of a ſhort and a long ſyllable.

Of their feet of three ſyllables a moloſſus conſiſted of three long ſyllables; a tribrach of three ſhort; a dactyl of one long and two ſhort; and an anapæſt of two ſhort and one long ſyllable. The Greek poets contrived 124 different meaſures under as many different names.

MEASURE, in muſick, the ſpace of time, which the perſon takes between the raiſing and falling of his hand or foot, in order to conduct the movement ſometimes quicker, and ſometimes ſlower, according to the ſubject ſung or played. The ordinary meaſure is one ſecond, or 60th part of a minute, being nearly the ſpace between the beats of the pulſe. It uſually takes up the ſpace that a pendulum of three feet and a half long employs in a ſwing or vibration.

The ſemi-breve holds one riſe and one fall; and this is called the whole meaſure; the minim one riſe or one fall; and the crotchet half a riſe or half a fall, there being four crochets in a full meaſure.

Binary or *double* MEASURE, that wherein the riſe and fall of the hand are equal.

Ternary or *triple* MEASURE, where the fall is double to the riſe, or where two minims are played during a fall, and but one in a riſe. The number three at the beginning of the lines denotes a triple meaſure, and a C the common or double meaſure.

MEASURING, or MENSURATION, in geometry, the aſſuming any certain quantity, and expreſſing the proportion of other ſimilar quantities to the ſame; or the determining by a certain known meaſure the preciſe extent, quantity, or capacity of any thing.

MEASURING, in general, conſtitutes the practical part of geometry. And, from the various ſubjects about which it is converſant, it acquires various names, and conſtitutes various arts.

Meaſuring of lines or quantities of one dimenſion is called longimetry; and, when thoſe lines are not extended parallel to the horizon, altimetry. When the different altitudes of the line are alone regarded, levelling. Meaſuring of ſuperficies or quantities of two dimenſions, when converſant about lands, is called geodeſia or ſurveying: in other caſes ſimply meaſuring. The inſtruments made uſe of are the ten feet rod, chain, compaſs, circumferentor, &c.

MEASURING *of Solids*, or quantities of three dimenſions, the ſame with ſtereometry: when it is converſant about the capacities of veſſels, or the liquors they contain, it is called gauging. As a meaſure is defined what is ſimilar to the thing meaſured; it is evident that in the firſt caſe, or in quantities of one dimenſion, the meaſure muſt be a line; in the ſecond a ſuperficies; and in the third a ſolid. A line, for inſtance, cannot meaſure a ſurface, ſince it can never be applied ſo often to a ſurface, as to be equal to it. And from the like reaſoning a ſuperficies, which has no depth, cannot become equal to a ſolid, which has.

Hence we ſee why the meaſure of a circle is an arch, for a right line can only touch a circle in one point, but the periphery of a circle conſiſts of infinite points; therefore a right line muſt be applied infinite times, which is impoſſible: again the right line only touches the circle in a mathematical point which has no dimenſions, and conſequently no magnitude; but a thing that has no magnitude bears no proportion to another that has, and cannot therefore meaſure it.

MEASURING *of Triangles*, from three ſides or angles to determine the reſt, is called trigonometry. See TRIGONOMETRY.

MEASURING *the Preſſure, Spring*, &c. *of the Air*, is called aerometry or pneumaticks. See PNEUMATICKS.

MEATUS, in anatomy, a duct or paſſage, which is applied to every canal in the body that conveys any fluid.

MEATUS *auditorius*, the auditory paſſage, in anatomy. See EAR.

MEATUS *a Palato ad Aurem*, in anatomy, the Euſtachian tube is ſo denominated.

MEATUS *Cyſticus*, in anatomy, the duct that conveys the bile from the gall-bladder to the duodenum.

MEATUS *Urinarius*, in anatomy, the urethra or urinary paſſage.

MECHANICKS, *Mechanica*, a mixed mathematical ſcience, which conſiders motion and moving powers, their nature and laws with the effects thereof, in machines, &c. The word is derived from the Greek μηχανική, which ſignifies the ſame thing, and derived from μηχανή, an inſtrument or ſkill. That part which conſiders motion ariſing from gravity, is ſometimes called ſtaticks, in contradiſtinction from that part which conſiders the mechanical powers and their application, properly called mechanicks.

MECHANICAL, ſomething relating to mechanicks.

MECHANICAL *Affections*, are ſuch properties in matter, as reſult from their figure, bulk, and motion.

MECHANICAL *Cauſes*, are ſuch as are founded on thoſe affections.

MECHANICAL *Solutions*, are accounts of things on the ſame principles.

MECHANICAL *Philoſophy*, or corpuſcular philoſophy, that which explains the phænomena of nature, and the operations of corporeal things, on the principles of mechanicks, namely, the motion, gravity, figure, arrangement, &c. of the parts which compoſe natural bodies.

MECHANICAL *Powers* or *Machines*, are ſix in number, viz. the lever, the pulley, the wheel and axle, the inclined plane, the wedge, and the ſcrew. They are called mechanical powers, becauſe they increaſe our power of moving or raiſing heavy bodies, which are often unmanageable by any human ſtrength, not thus aſſiſted; and of two or more of theſe all other compound machines are compoſed.

As the learned Dr. Hamilton, profeſſor of the mathematicks in the univerſity of Dublin, has lately publiſhed a new theory of the mechanical powers, and diſplayed the principles on which we may beſt explain their nature and manner of acting; we ſhall lay before our readers the ſubſtance of his ingenious eſſay, in his own words. "The many uſeful inſtruments," ſays this able mathematician, "that have been ſo ingeniouſly invented, and ſo ſucceſsfully executed, and the great perfection to which the mechanick arts are now arrived, would naturally incline one to think that the true principles on which the efficacy and operations of the ſeveral machines depend, muſt long ſince have been accurately explained. But this is by no means a neceſſary inference; for, however men may differ in their opinions about the true method of accounting for the effects of the ſeveral machines, yet the practical principles of mechanicks are ſo perfectly known by experience and obſervation, that the artiſt is thereby enabled to contrive and adjuſt the movements of his engines with as much certainty and ſucceſs as he could do, were he thoroughly acquainted with the laws of motion, from which theſe principles may be ultimately derived. However, though an enquiry into the true method of deducing the practical principles of mechanicks from the laws of motion, ſhould perhaps not contribute much to promote the progreſs of the mechanick arts, yet it is an enquiry in itſelf uſeful, and in ſome meaſure neceſſary; for, ſince late authors have uſed very different methods of treating this ſubject, it may be ſuppoſed that no one method has been looked upon as ſatisfactory, and unexceptionable. I ſhould therefore wiſh to contribute towards having this ſubject treated with more accuracy than has been hitherto done.

"The moſt general and remarkable theorem in mechanicks certainly is this, That when two weights, by means of a machine counterpoiſe each other, and are then made to move together, their quantities of motion will be equal. Now an æquilibrium always accompanying this equality of motions, bears ſuch a reſemblance to the caſe wherein two moving bodies ſtop each other, when they meet together with equal quantities of motion; that Dr. Wallis, and after him moſt of the late writers, have thought the cauſe of an æquilibrium in the ſeveral machines, might be immediately aſſigned; by ſaying, That ſince one body cannot produce in another a quantity of motion equal to its own, without loſing its own at the ſame time; two heavy bodies counteracting each other by means of a machine muſt continue at reſt, when they are ſo circumſtanced that one cannot deſcend, without cauſing the other to aſcend at the ſame time, and with the ſame quantity of motion; and therefore two heavy bodies in ſuch caſes muſt always counterbalance each other. Now this argument would be a juſt one, if it could properly be ſaid that the motion

of the ascending body was produced by that of the descending one; but, since the bodies are so connected that one cannot possibly begin to move before the other, I apprehend, that, if the bodies are supposed to move, it cannot be said that the motion of one is produced by that of the other: since whatever force is supposed to move, one must be the immediate cause of motion in the other also; that is, both their motions must be simultaneous effects of the same cause, just as if the two bodies were really but one. And therefore if I was to suppose, in this case, that the superior weight of the heavier body (which may be in itself much more than able to sustain the lighter) should overcome the weight of the lighter and produce equal motions in both bodies; I do not think that from thence I could be reduced to the absurdity of supposing, that one body, by its motion, might produce in another a motion equal to its own, and yet not lose its own at the same time. But those who argue from the equality of motions on this occasion say further, that, since the two bodies must have equal motions when they do move, they must have equal endeavours to move even while they are at rest, and therefore these endeavours to move, being equal and contrary, must destroy each other, and the bodies must continue at rest, and consequently balance each other. In answer to this I must observe, that the absolute force with which a heavy body endeavours to descend from a state of rest can only be proportionable to its weight; and therefore I think it is necessary that some cause should be assigned why (for instance in the lever) the endeavour of one pound to descend shall be equal to that of four pounds; and especially as the fulcrum on which both weights act requires no greater force to support it than that of five pounds.

"From these considerations I infer, that the reason why very unequal weights may balance each other, should be assigned not from their having equal momenta when made to move together, but by proving a priori without considering their motions, that either the reaction of the fixed parts of the machine, or some other cause, so far takes off from the weight of the heavier body as to leave it only just able to support the lighter. However, as this equality of momenta which always accompanies an æquilibrium, affords a very elegant theorem, it ought to be taken notice of in every treatise of mechanicks, and may serve as an index of an æquilibrium. But I would not have it applied to a purpose for which it is unfit; as it has been in another instance by Doctor Keil, who from thence gives the reason why water stands at the same height in a narrow tube and a wide vessel with which it communicates. And an argument of the same kind is applied still more improperly by Dr. Rutherforth and others, to shew why a drop of water included in a small conical tube will move towards the narrower end; and yet the true ways of accounting for both these phænomena are extremely obvious and easy.

"The simple mechanick powers are usually reckoned six, the lever, axle and wheel, pully, wedge, inclined plane, and screw. The only method I have met with of explaining the nature of these machines upon one and the same principle, is that which I just now examined: and, as that appears to me unsatisfactory, I shall consider the nature of each machine separately in the order I have set them down.

"The lever is said to be a right line, inflexible and void of weight. Its fundamental property is this; when any two forces act against each other on the arms of a lever, they will continue in æquilibrio, if their quantities are inversely as the distances between the points to which they are applied and the point round which the lever turns, which point is called the fulcrum or prop.

"Several methods have been used, by different authors, to prove, that this property must necessarily belong to the lever. We find, in the works of Archimedes, a proof brought for this purpose, which has since been made use of by several writers of mechanicks; who, I find, have somewhat altered the form of his argument, the subject of which is generally expressed as follows: When a cylinder of any uniform matter is supported at its middle point, it will continue at rest; for all the parts on one side must balance those on the other, being exactly equal to them both in weight and situation, so that the whole weight of this cylinder may be looked upon as acting on the middle point on which it is supported. From whence it follows, that the weight of such a cylinder will act upon whatever supports it, in the same manner as it would do if it was all contracted into the middle point of its axis. If therefore we suppose the cylinder to be distinguished into two unequal cylinders or segments, the distances between the middle points of these segments and the middle of the whole cylinder will be inversely as the lengths of the segments; that is, inversely as their weights: but, as it was said before, the weight of each cylinder acts in the same manner as it would do if contracted into the middle point of its axis; and therefore if the weights of those cylinders be contracted into these points, they will continue to support each as before. And thence it is concluded, that any two weights acting against each other on a line sustained at a fixed point, will counterpoise one another, when they are inversely as the distances of the points on which they act, from the point on which the line rests. To this argument there seems to be a manifest objection; for, when the whole cylinder is distinguished into two segments, part of the weight of the greater segment acts on the same side of the fulcrum with the less segment; and therefore when the whole weight of the greater segment is contracted into its middle point on one side of the fulcrum, and acts all of it against the less segment, it requires at least some proof to shew, that this contracted weight will be balanced by the weight of the less segment. Mr. Hugens, in his Miscellaneous Observations on Mechanicks, takes notice of this objection to Archimedes's method, which, he says, several mathematicians had endeavoured to remove, but without success. He therefore, instead of this method, proposed one of his own, which depends on a postulatum that he uses in common with Archimedes, and which I think ought not to be granted on this occasion; it is this: When equal bodies are placed on the arms of a lever, the one which is furthest from the fulcrum will prevail and raise the other up. Now this is taking it for granted, in other words, that a small weight placed further from the fulcrum will support or raise a greater one. The cause and reason of which fact must be derived from the demonstration that follows, and therefore this demonstration ought not to be founded on the supposed self-evidence of what is partly the thing to be proved. But perhaps it may be said, that the postulatum may be granted merely on this account; that the centre of gravity of the two bodies (which in this case is the middle point between them) is not sustained; and therefore the body which is on the same side of the fulcrum with the centre of gravity will descend.

"In answer to which I must observe, that this property, which the centre of gravity has of descending, when not placed directly above or below the point of suspension, cannot be proved to belong to it in any case, nor can we even shew that there is only one centre of gravity between two bodies joined by a right line, until it is proved in general that the centre of gravity of any two bodies is a point so placed between them that their distances from it are inversely as their weights: but this in effect includes the principal property of the lever, which therefore cannot be proved from any previous supposition, that the centre of gravity will descend, even when the bodies are equal, and we know it is the middle point between them.

"I must now proceed to consider what Sir Isaac Newton hath delivered on this subject in his Principia, after the 2d cor. to the 3d law of motion which Dr. Clarke (in his notes on Rohault) and all the subsequent writers, have quoted as an elegant proof of the property of the lever; and therefore what appears to me at present an objection to this proof I shall mention with great diffidence, and in hopes of being set right if I am wrong. Sir Isaac supposes two weights, as A and P (*plate* LVI. *fig.* 14.) to hang by threads, from the points M and N in a wheel or circular plane perpendicular to the horizon and moveable about its centre O; and then proposes to determine the forces with which these weights act to turn the wheel round its centre. In order to do this, he supposes that it is indifferent from what points in the perpendicular lines M A and N P the weights are hung, for that they will still have the same power to turn the wheel about its centre. His words are: Quoniam nil refert

utrum filorum puncta K, L, D, affixa sint vel non affixa ad planum rotæ; pondera idem valebunt ac si suspenderentur a punctis K & L, vel D & L. Now whether the points of the threads K, L, D, are fixed or not to the plane of the wheel is certainly of importance, as it must make a difference in the points of suspension of the weights, and consequently in the degrees of obliquity with which the weights act; for the lowest point of the thread that is fixed to the plane must be considered as the point from which the weight hangs; as the parts of the thread above that point are quite useless, not being at all acted upon. And from thence I shall endeavour to shew that to suppose the weight A will have the same power to turn the wheel from whatever point in the line M A it hangs, is in effect presupposing what is intended to be proved. For it appears, from what he says immediately after, that, when the weight A hangs from the point D, if its whole force be expressed by the line A D, and be resolved into two forces, D C and A C, the former only will have any effect in turning the wheel, as it acts perpendicularly on the radius O D, while the latter is lost, its direction being parallel to O D. But it is evident, that, when the same weight hangs from the point K, as it acts perpendicularly on the radius O K, its whole force is exerted to turn the wheel, and none of it lost by oblique action.

"Therefore the force which the weight A, exerts to oppose the weight P, and turn the wheel when it hangs from D, is, to the force it exerts when it hangs from K, as the line D C to A D, or as O K, to O D, (sim. triang. A D C, D O K) that is, the force exerted by the weight A, hanging from the points D and K, are inversely as the radii O D, and O K. And therefore to suppose, that these two forces will have the same effect in turning the wheel and opposing the weight P, is the same as supposing that two forces will have equal effects in moving the arms of a lever (on which they act perpendicularly) when they are inversely at the lengths of those arms.—But this is the very conclusion Sir Isaac draws from his premises, for he says: "Pondera igitur A & P, quæ sunt reciproce ut radii in directum positi O K, O L, idem pollebunt et sic consistent in æquilibrio, quæ est proprietas notissima libræ, vectis et axis in peritrochio." But further, this property of the lever, which is here expressed in general terms, includes two cases. For the arms of the lever may be either perpendicular or oblique to the directions of the weights. The first of these cases is the simplest, and should be first demonstrated: and I do not see how there can be any room for applying the resolution of forces in demonstrating this case, in which no part of either weight is lost by oblique action. But when this case is proved, we have from thence, by the resolution of forces, an easy way of shewing in the second case, when the arms of the lever are oblique to the directions of the weights, that the weights will counter balance each other, when they are reciprocally as the perpendicular distances of their lines of direction from the centre of motion. From the last of these cases, we may deduce an obvious reason why the weight A should have the same power to turn the wheel, from whatever point it hangs in the line M A; the truth of which I am persuaded, cannot be proved independent of those cases, and therefore think it ought not to be used as a postulatum in demonstrating the general property of the lever.

"Mr. Maclaurin, in his View of Newton's Philosophy, after giving us the methods which Archimedes and Newton have used for proving the fundamental property of the lever, proposes one of his own, which, he says, appears to be the most natural one for this purpose. However as to this method I shall only observe, that, from equal bodies sustaining each other at equal distances from the fulcrum, he shews us how to infer that a body of one pound (for instance) will sustain another of two pounds at half its distance from the fulcrum: and from thence that will sustain one of three pounds at a third of its distance from the fulcrum: he goes on declaring, by a kind of induction, what the proportion is in general between two bodies that sustain each other on the arms of the lever. But this argument he observes cannot be applied when the arms of the lever are incommensurable, and therefore it cannot conclude generally, and consequently is imperfect.

"These are the methods of demonstrating the fundamental property of the lever, which are worth taking notice of; and, since they seem liable to objections, and the other methods I have met with are still more exceptionable, I shall propose a new proof of this property of the lever, which appears to me a very simple one, and depends on a postulatum that, I believe, will be readily granted.

"If a force be uniformly diffused over a right line, that is, if an equal part of the force acts upon every point of the line, and if the whole force acts according to one and the same plane; this force will be sustained, and the line kept in æquilibrio, by a single force applied to the middle point of the line equal to the diffused force, and acting in a contrary direction.

"In order to shorten the following proof, I must premise by way of lemma, that, if a right line be divided into two segments, the distances between the middle of the whole line, and the middle points of the segments, will be inversely as the segments. This is self-evident when the segments are equal; and, when they are unequal, then, since half of the whole line is equal to half of the greater and half of the lesser segment, it is plain that the distance between the middle of the whole line and the middle of one segment must be equal to half of the other segment, so that these distances must be to each other inversely as the segments, all which appears evident from the inspection of (*fig.* 15).

"Let now the line G H, (*fig.* 15.) whose middle point is D, be divided into the unequal segments G L, and L H, whose middle points are C and F, and let two forces or weights, A and B, which are to each other as the segments G L and L H, be applied to their middle points C and F, and let them act perpendicularly on the line G H. Then (by the lemma) the weights A and B will be to each other inversely as C D, and F D, (the distances of the points C and F, to which they are applied from the middle of the whole line) if then a third force or weight E, equal to the sum of the forces A and B, be applied to the point D, and acts on the line in an opposite direction: I say these three forces will sustain each other, and keep the line in æquilibrio. For let us suppose the force E to be removed and instead of it another force, equal also to the sum of A and B, to be uniformly diffused over the whole line G H, and to act directly against the forces A and B, then the part of this force which acts on the segment G L, will be equal to the force A, and therefore will be sustained by it (postulatum); and the other part, which is diffused over the segment L H, will be equal to and sustained by the force B, so that the forces A and B will sustain this diffused force and keep the line in æquilibrio. Let now two other forces act also on this line in opposite directions, one of them the force E acting on the point D, as it was first supposed to do, and the other an uniformly diffused force equal to E (and consequently equal to the other diffused force,) then these two additional forces will also balance each other (postulatum) and therefore the æquilibrium will still remain. So that the two forces A and B, and a diffused force acting on one side of the line sustain the force E and a diffused force acting on the other side: but it is manifest, that in this æquilibrium, the two diffused forces acting on opposite sides are perfectly equivalent, and therefore if they are taken away from both sides, the æquilibrium must still remain. Hence it appears that the three weights or forces A, B and E, any two of which are (by the construction) to each other inversely as their distances from the third, will sustain each other and keep the line on which they act in æquilibrio; which is the first and most simple case of the property of the lever; for here the directions of the weights are supposed to be perpendicular to the line on which they act, and it is evident that, if one of the points C, D or F, be fixed or considered as a fulcrum, the weights acting on the other two points will continue to support each other. I shall not now take the trouble of proving the second case of the property of the lever; it is most easily deduced from the first; for when two weights act on the arms of a lever in oblique directions, and are to each other inversely as the perpendicular distance of their lines of direction from the centre of motion, then, by the resolution of forces, it is easily proved that the parts of those forces which act perpendicularly on the arms of the lever, and which only are exerted to turn the lever, are

to

to each other inverſely as the lengths of thoſe arms; and therefore by the firſt caſe they muſt balance each other.

" I ſhall now mention ſome well known truths in mechanicks, which, I think, cannot be proved otherwiſe than by deducing them from what hath been here demonſtrated.

" Corollary 1. It appears from hence, that the powers with which any two forces move or endeavour to move the arms of a lever, are as the rectangles, under lines proportional to the forces, and the perpendicular diſtances of their lines of direction from the fulcrum.

" Cor. 2. When therefore two bodies acting on the arms of a lever ſuſtain each other, if one of them be removed further from the fulcrum, it will preponderate; but if it be brought near to the fulcrum, the other weight will prevail: becauſe the product to which its force is proportionable will be encreaſed in the firſt caſe, and diminiſhed in the ſecond.

" Cor. 3. We learn from hence, to find out the centre of gravity of any two bodies joined by an inflexible right line; and to prove that its definition will agree to one point only in the line. For if a point be taken in the line, ſo that the diſtances of the bodies from it may be inverſely as their weights, that point will be their centre of gravity, becauſe, when it is ſuſtained, the bodies will be in æquilibrio. But if the line be ſuſtained at any other point, then is the fulcrum removed further from one body and brought nearer to the other than it was when the bodies balanced each other; and therefore, by the preceding Cor. that body from which it is removed, or which is on the ſame ſide with the centre of gravity, will deſcend. Conſequently there is but one point in the line, which being ſuſtained, the bodies will continue in æquilibrio, and therefore but one point only can be their centre of gravity. Hence alſo it appears, that the centre of gravity will always deſcend, when it is not directly above or below the point by which the body is ſuſtained.

" I ſhall now endeavour to be as conciſe as poſſible in what I have to ſay of the other mechanick powers; having, I fear, been two tedious in my account of the lever, which however deſerves to be particularly conſidered, ſince to it may be reduced the balance, the axle and wheel, and (according to ſome writers) the pulley.

" The balance I do not conſider as a diſtinct machine, becauſe it is evidently no other than a lever fitted to the particular purpoſe of comparing weights together, and does not ſerve for raiſing weights or overcoming reſiſtances, as the other machines do.

" When a weight is to be raiſed by means of an axle and wheel, it is faſtened to a cord that goes round the axle, and the power, which is to raiſe it, is hung to a cord that goes round the wheel. If then the power be to the weight as the radius of the axle to the radius of the wheel, it will juſt ſupport that weight; as will eaſily appear from what was proved of the lever. For the axle and wheel may be conſidered as a lever, whoſe fulcrum is a line paſſing through the centre of the wheel and middle of the axle, and whoſe long and ſhort arms are the radii of the wheel and axle which are parallel to the horizon, and from whoſe extremities the cords hang perpendicularly. And thus an axle and wheel may be looked upon as a kind of perpetual lever, on whoſe arms the power and weight always act perpendicularly, though the lever turns round its fulcrum. And in like manner when wheels and axles move each other by means of teeth on their peripheries, ſuch a machine is really, a perpetual compound lever: and, by conſidering it as ſuch, we may compute the proportion of any power to the weight it is able to ſuſtain by the help of ſuch an engine. And ſince the radii of two contiguous wheels, whoſe teeth are applied to each other, are as the number of teeth in each, or inverſely as the number of revolutions, which they make in the ſame time; we may, in the computation, inſtead of the ratio of theſe radii, put the ratio of the number of teeth on each wheel; or the inverſe ratio of the number of revolutions they make in the ſame time.

" Some writers have thought the nature and effects of the pulley might be beſt explained by conſidering a fixed pulley as a lever of the firſt, and a moveable pulley as one of the ſecond kind. But though the pulley may bear being conſidered in that light, yet, I think, the beſt and moſt natural method of explaining its effects (that is, of computing the proportion of any power to the weight it can ſuſtain by means of any ſyſtem of pulleys) is, by conſidering that every moveable pulley hangs by two ropes equally ſtretched, which muſt bear equal parts of the weight; and therefore when one and the ſame rope goes round ſeveral fixed and moveable pullies, ſince all its parts on each ſide of the pullies are equally ſtretched, the whole weight muſt be divided equally amongſt all the ropes by which the moveable pullies hang. And conſequently if the power which acts on one rope be equal to the weight divided by the number of ropes, or double the number of moveable pullies, that power muſt ſuſtain the weight.

" Upon this principle, the proportion of the power to the weight it ſuſtains by means of any ſyſtem of the pullies, may be computed in a manner ſo eaſy and natural as muſt be obvious to every common capacity.

" The proportion which any power bears to the reſiſting force it is able to ſuſtain by means of a wedge, has been laid down differently by different authors, as they happened to conſider it in particular caſes. Without examining their ſeveral opinions, I ſhall endeavour to expreſs this proportion in one general propoſition which may extend to the ſeveral caſes in which the wedge is applied.

" Let the æquicrural triangle A B C, (*fig.* 1.) repreſent a wedge, the lines A B and C B will be the ſides of the wedge, A C its baſe or back, and its height will be the line P B biſecting the baſe A C, and alſo the vertical angle A B C. When any two reſiſting forces act on the ſides of a wedge in directions which make equal angles with the ſides (as they are always ſuppoſed to do) a power acting perpendicularly at P on the baſe of the wedge will keep the reſiſting forces in æquilibrio, when it is to the ſum of theſe forces, as the ſine of half the vertical angle of the wedge, to the ſine of the angle which the directions of the forces contain with the ſides of the wedge.

" For let E and F be two bodies acting on the ſides of the wedge, and let them be firſt ſuppoſed to act in the directions E P and F P perpendicularly on the baſe A C, if theſe three forces keep the wedge in æquilibrio they will be to each other as the ſides of a triangle, to which their directions are parallel, or (which is the ſame thing) as the ſides of the triangle A B C to which their directions are perpendicular. Therefore the power P is to the ſum of the reſiſting forces which it ſuſtains as A C the baſe of the wedge to the ſum of the ſides, or as P A, half the baſe, to A B one of the ſides; but P A is to A B as the ſine of P B A, half the vertical angle of the wedge, to the radius which is the ſine of a right angle, and the directions of the reſiſting forces are ſuppoſed in this caſe to contain a right angle with the ſides of the wedge.

" Let now the reſiſting bodies E and F be ſuppoſed to act on the wedge in directions parallel to the lines D P and O P, which make oblique angles with its ſides, draw E G and F K perpendicular to thoſe lines. From what has been proved it appears that the power P is to the force with which it is able, by means of the wedge, to protrude the reſiſting bodies in the directions P E and P F as the ſine of half the vertical angle to the radius: let this protruding force be expreſſed by the line P E, and let it be reſolved into two forces expreſſed by the lines P G and G E, the former of theſe only will act in oppoſition to the reſiſting bodies; therefore the whole protruding force of the power is to the force with which it acts againſt the reſiſting bodies P E and P F in the directions P D and P O as P E to P G, or, (becauſe the triangles E P G and D P E are ſimilar) as P D to P E, that is as the radius to the ſine of the angle P D E; compounding therefore the ratio of the ſine of half the vertical angle to the radius, with the ratio of the radius to the ſine of the angle P D E, the power P, when the wedge is kept in æquilibrio, will be to the force with which it protrudes the reſiſting bodies in directions oppoſite to thoſe in which they act, as the ſine of half the vertical angle to the ſine of the angle P D E or P O F, which the directions of the reſiſting forces contain with the ſides of the wedge.

" Hence, when the directions in which reſiſting bodies act on a wedge are given, we may eaſily find two lines that will expreſs the proportion between the reſiſtance and the power which ſuſtains it by means of the wedge,

For from P the middle point of the wedge draw the line P D meeting one of the ſides, and parallel to the direction in which the reſiſting force acts on that ſide, then the power will be to the reſiſtance as P D to P B the height of the wedge. For P D and P B are to each other as the ſines of the oppoſite angels, in the triangle P B D, that is as the ſines of half the vertical angle, and the angle which the direction of the reſiſting force contains with the ſide of the wedge.

" From what has been demonſtrated we may deduce the proportion of the power to the reſiſtance it is able to ſuſtain in all the caſes in which the wedge is applied. Firſt, when in cleaving timber the wedge fills the cleft, then the reſiſtance of the timber acts perpendicularly on the ſides of the wedge, therefore on this caſe, when the power which drives the wedge, is to the coheſive force of the timber, as half the baſe, to one ſide of the wedge, the power and reſiſtance will be in æquilibrio.

" Secondly, when the wedge does not exactly fill the cleft, which generally happens becauſe the wood ſplits to ſome diſtance before the wedge. Let E L F, repreſent a cleft into which the wedge A B C is partly driven; as the reſiſting force of the timber muſt act on the wedge in direction perpendicular to E L the ſide of the cleft, and meeting the ſide of the wedge in D; then the power driving the wedge and the reſiſtance of the timber, when they balance, will be to each other as the line P D to P B, the height of the wedge.

" Thirdly, when a wedge is employed to ſeparate two bodies that lie together on an horizontal plane, for inſtance, two blocks of ſtone; as theſe bodies muſt recede from each other in horizontal directions, their reſiſtance muſt act on the wedge in lines parallel to its baſe C A; therefore the power which drives the wedge will balance the reſiſtance when they are to each other as P A half the breadth of the wedge to P B its height; and then any additional force ſufficient to overcome the reſiſtance ariſing from the friction of the bodies on the horizontal plane will ſeparate them from each other.

" The inclined plane is reckoned by ſome writers among the mechanick powers; and I think with reaſon, as it may be uſed with advantage in raiſing weights.

" Let the line A B (*fig.* 6.) repreſent the length of an inclined plane, A D its height, and the line B D we may call its baſe. Let the circular body G E F be ſuppoſed to reſt on the inclined plane, and to be kept from falling down it by a ſtring C S tied to its centre C. Then the force with which this body ſtretches the ſtring will be to its whole weight, as the ſine of A B D the angle of elevation, to the ſine of the angle which the ſtring contains with a line perpendicular to A B the length of the plane. For let the radius C E be drawn perpendicular to the horizon, and C F perpendicular to A B, and from E draw E O parallel to the ſtring and meeting C F in O. Then, as the body continues at reſt and is urged by three forces, to wit, by its weight in the direction C E, by the reaction of the plane in the direction F C, and by the reaction of the ſtring in the direction E O; the reaction of the ſtring, or the force by which it is ſtretched, is to the weight of the body, as E O to C E: that is, as the ſine of (the angle E C O, which is equal to) A B D the angles of elevation, to the ſine of the angle E O C, equal to S C O, the angle which the ſtring contains with the line C F perpendicular to A B, the length of the plane.

" When therefore the ſtring is parallel to the length of the plane, the force with which it is ſtretched, or with which the body tends down the inclined plane, is to its whole weight, as the ſine of the angle of elevation, to the radius, or as the height of the plane to the length. And in the ſame manner it may be ſhewn, that when the ſtring is parallel to B D, the baſe of the plane, the force with which it is ſtretched is to the weight of the body, as A D to B D, that is, as the height of the plane to its baſe. If we ſuppoſe the ſtring, which ſupports the body G E F, to be faſtened at S, and that a force, by acting on the line A D, the height of the plane, in a direction parallel to the baſe B D, drives the inclined plane under the body, and by that means makes it riſe to a direction parallel to A D. Then, from what was proved in the third caſe of the wedge, it will appear, that this force muſt be to the weight of the body, as A D to B D, or rather in a proportion ſomewhat greater: if it makes the plane move on and the body riſe.

" From this laſt obſervation we may clearly ſhew the nature and force of the ſcrew; a machine of great efficacy in raiſing weights or in preſſing bodies cloſely together. For if the triangle A B D be turned round a cylinder whoſe periphery is equal to B D, then the length of the inclined plane B A will riſe round the cylinder in a ſpiral manner; and form what is called the thread of the ſcrew, and we may ſuppoſe it continued in the ſame manner round the cylinder from one end to the other; and A D the height of the inclined plane will be every where the diſtance between two contiguous threads of this ſcrew, which is called a convex ſcrew. And a concave ſcrew may be formed to fit this exactly, if an inclined plane every way like the former be turned round the inſide of a hollow cylinder, whoſe periphery is ſomewhat larger than that of the other. Let us now ſuppoſe the concave ſcrew to be fixed, and the convex one to be fitted into it, and a weight to be laid on the top of the convex ſcrew: then, if a power be applied to the periphery of this convex ſcrew to turn it round, at every revolution the weight will be raiſed up through a ſpace equal to the diſtance between the two contiguous threads, that is to the line A D the height of the inclined plane B A; therefore ſince this power, applied to the periphery, acts in a direction parallel to B D, it muſt be to the weight it raiſes as A D to B D, or as the diſtance between two contiguous threads, to the periphery of the convex ſcrew.

" The diſtance between two contiguous threads is to be meaſured by a line parallel to the axle; if we now ſuppoſe that a hand-ſpike or handle, which is inſerted into the bottom of the convex ſcrew, and that the power which turns the ſcrew is applied to the extremity of this handle, which is generally the caſe; then as the power is removed further from the axis of motion, its force will be ſo much increaſed (*vide* what was ſaid of the lever, Cor. 1.) and therefore ſo much may the power itſelf be diminiſhed. So that the power, which, acting on the end of a handle, ſuſtains a weight by means of a ſcrew, will be to that weight, as the diſtance between two contiguous threads of the ſcrew, to the periphery deſcribed by the end of the handle. In this caſe we may conſider the machine as compoſed of a ſcrew and a lever, or as Sir Iſaac Newton expreſſeth it, *Cuneus a vecte impulſus.*

Of any two or more of theſe ſimple machines combined together, all other machines however complicated are compoſed. And their powers and manner of acting may therefore be explained from the principles here laid down.

Mechanical, alſo denotes a kind of reaſoning, which has lately prevailed much not only in phyſick but in accounting for the phænomena of health and diſeaſes, as being conformable to what is uſed in the contrivance and in ſolving the operations of machines.

For, ſays Dr. Quincy, conſidering an animal body as a compoſition out of the ſame matter, from which all other bodies are formed, and to have all thoſe properties which concern a phyſician's regard, only by virtue of its peculiar conſtruction; it naturally leads a perſon to conſider the ſeveral parts, according to their figures, contexture, and uſe, either as wheels, pullies, wedges, levers, ſkrews, cords, canals, ſtrainers, &c. For which purpoſe, continues he, it is frequently found helpful to deſign in diagrams, whatſoever of that kind is under conſideration, as is cuſtomary in geometrical demonſtrations. See Human *Body*.

Mechanical, in mathematicks, denotes a conſtruction of ſome problem, by the aſſiſtance of inſtruments, as the duplicature of the cube and quadrature of the circle, in contradiſtinction to that which is done in an accurate and geometrical manner.

Mechanical *Curve*, is a curve, according to Deſcartes, which cannot be defined by any algebraick equation: and ſo ſtands contradiſtinguiſhed from algebraick or geometrical curves. Leibnitz and others call theſe mechanical curves tranſcendental, and diſſent from Deſcartes in excluding them out of geometry. Leibnitz found a new kind of tranſcendental equations whereby theſe curves are defined: But they do not continue conſtantly the ſame in all points of the curve, as algebraick ones do.

MECHOACAN, in pharmacy, a large root of a plant of the ſame genus with the turpeth. When entire, it

is usually 12 or 14 inches long, and above the thickness of a man's wrist. What we see of it in the shops is cut into slices, for the convenience of drying.

The plant is one of the pentandria monogynia of Linnæus, and of the herbæ vasculiferæ of Mr. Ray. The root in powder is a gentle and mild purgative, and occasions no sickness or gripings during its operations; besides this, it is insipid.

It was greatly celebrated when first brought into Europe; but the brisker operation of jalap, and the smaller dose necessary, soon brought it into use in its stead. It is a reproach to us, says Hill, to have suffered this drug to get into disuse, since there is not a better purgative in all the materia medica; scarce any one liable to so few accidents; the greatest objection is the dose, which is from one to two drachms.

MECONIUM, the concreted or dried juice of the poppy which has been expressed from the heads and leaves or from the whole plant; whereas opium is a tear distilling from the heads of the poppy, after a slight incision made therein.

The word is Greek μηκώνιον, signifying the same thing, and derived from μήκων, the poppy. It also denotes the excrements contained in the intestines of the child, during the time of gestation, and which are voided after the birth.

MEDAL, *Medalia*, a piece of metal in form of a coin, destined to preserve the memory of some great man, and some memorable action.

A medal has two sides; one of which is called the face or head, and the other the reverse: on each side is the area or field, which makes the middle of the medal; the rim or border and the exergue which is beneath the ground whereon the figures are placed. The type or device is the figures represented, and the legend is the inscription round them.

The Greek medals are the most ancient, as plainly appears from several medals of Macedon, older than Philip and Alexander; from those with the names of several magistrates prior to the Macedonian empire; to which we may add some Sicilian coins of still greater antiquity. As the Greek medals are the most ancient, so are they the most beautiful, expressing even the muscles and veins, and are struck with such exquisite art as the Romans could never come up to.

The consular medals, or those struck when the republick was governed by consuls, are the most ancient among the Romans.

The copper and silver ones do not go beyond the 484th year of Rome, nor the gold ones beyond the year 546.

Among the imperial medals we distinguish between those of the upper and lower empire: the upper commenced under Julius Cæsar, and ended A. D. 260. The lower includes about 1200 years, namely, till the taking of Constantinople. It is however usual to account all the imperial medals till the time of the Palæologi among the antique, though we have none of any considerable beauty later than the time of Heraclius, who died in 641. For, after the emperors Phocas and Heraclius, Italy became a prey to the Barbarians.

MEDALLION, or MEDALION, a medal of an extraordinary size, supposed to be anciently struck by the emperors for their friends, and for foreign princes and ambassadors; but that the smallness of their number might not endanger the loss of the devices they bore, the Romans generally took care to stamp the subject of them upon their ordinary coins.

Medallions, in respect of the other coins, were the same as modern medals in respect of modern money: they were exempted from all commerce, and had no other value but what was set upon them by the fancy of the owner. Medallions are so scarce that there cannot be any set made of them, even though the metals and sizes should be joined promiscuously.

MEDEOLA, in botany, a genus of the hexandria-trigynia class of plants, the flower of which consists of six oblong, patent, and revolute petals: the fruit is a berry of a roundish form, with three cells, in each of which is contained a single cordated seed.

MEDIAL, or ALLIGATION MEDIAL, in arithmetick. See ALLIGATION.

MEDIANA, a vein formed by the concourse of the cephalick and basilick veins in the bend of the elbow.

MEDIASTINUM, in anatomy, is a double membrane continuous to the sternum, situated under it, and adhering firmly to it. It divides the cavity of the thorax longitudinally into two parts: but as it is not exactly under the middle of the sternum, but somewhat to the left side, the right part of the thorax is larger than the left. The mediastinum is connected with the sternum, pleura, pericardium, and other adjoining parts. It receives veins and arteries from the mammary and diaphragmatick vessels, and sometimes has proper and particular ones of its own from the aorta and cava: these are then called the mediastinal vessels. Its nerves which are small, are from the diaphragmaticks and the par-vagum. It has also a number of lymphaticks, which run to the ductus thoracicus. The uses of the mediastinum are two.

The first is to divide the breast longitudinally into two parts, by which several great purposes are answered; as, 1. That on one of the lobes of the lungs being ulcerated, the other might not be immediately affected. 2. That water, matter, or any thing else contained in one part of the thorax, might not at the same time affect both parts of the lungs. 3. That in case of a wound in one side of the thorax, respiration might be continued in the other, and the person not be immediately suffocated. The second general use of the mediastinum, is to support the heart in its pendulous state, for the benefit of its free motion, especially when we lie on our backs.

MEDIASTINUM *Cerebri*, the same with the transverse septum of the brain. See BRAIN.

MEDIATE, or *Intermediate*, something that stands between and connects two or more terms, considered as extremes; in which sense it is opposed to immediate.

MEDICINE, *Medicina*, the art which treats of the means of preserving health, when present; and of restoring it, when lost. If we look back to the origin of the art of medicine, we shall find its first foundations to be owing to mere chance, unforeseen events, and natural instinct: in the early ages, the sick were placed in cross-ways, and other publick places, to receive the advice of those passengers who knew an efficacious remedy suitable to their disorder. And the better to preserve the memory of a remarkable cure, both the disease and the remedy were engraved on pillars, or written on the walls of temples, that patients in the like cases might have recourse to them for instruction and relief. Thus what mere accident had discovered, was registered in these chronicles of health. This art arose from repeated trials and long experience, which gave an insight into the virtues of herbs and plants, metals and minerals.

As to the part which reason has acted in the improvement of medicine, it seems to have consisted in observing, 1. That diseases attended with particular circumstances, called symptoms, were sometimes cured without the assistance of art, by spontaneous evacuations, as hæmorrhages, diarrhœas, vomitings, or sweats; whence bleeding, purges, and vomits took their rise. 2. That the patients were often relieved, by the breaking out of various tumours; whence arose the application of topical remedies. And, indeed, it is the best method of improving physick, to observe carefully what means nature, unassisted by art, employs to free the constitution from distempers; since many important hints may be thence taken, for the relief of other patients under the like circumstances.

So much for the rise of this art. Let us now say something of the regular method of studying it. And first, with Boerhaave, let us imagine the young student laying the foundation of his art in the contemplation of geometrical figures, bodies, weights, measures, velocity, the fabrick of machines, and the power of acting upon other bodies thence arising. While he employs his thoughts about these matters, he is likewise taught a just method of reasoning; after which he may proceed to inform himself of the properties of fluidity, elasticity, tenuity, weight, and tenacity of liquids, from hydrostaticks. His reason being by this time much improved, he next applies to study the forces of fluids upon machines, and of these upon fluids; and to demonstrate them by mathematicks, confirm them by hydrostaticks, and illustrate them by chymical experiments; at the same time entertaining himself with speculations on the nature of fire, water, air, salts, and other homogeneous

bodies.

bodies. Having laid this foundation, his next businefs is to apply himfelf to the ftudy of anatomy, in order to obtain a clear idea of the human fabrick. To this he joins the knowledge of the vital fluids, and examines them with the affiftance of anatomy, chymiftry, hydroftaticks, and even of the microfcope; and fo now you fee him qualified for writing a theory of health, and inveftigating the caufes of difeafes. Now behold him bufied in furnifhing himfelf with medicinal obfervations, from all quarters; fometimes he diffects the dead bodies of perfons, whofe difeafes he had obferved; at other times, he marks the fymptoms of ficknefs procured by art in brutes; and at length collecting together all the effects of difeafes, with their remedies, whether learned from his own experience, or found in the beft authors, he digefts, confiders, and compares them with thofe which are demonftrated by theory. This, he tells us, is the method which he took himfelf, and which he recommended to his pupils, in order to gain a thorough knowledge of medicine.

If, then, he would advance the healing art, he ought to collect a felect treafure of practical obfervations, reft fatisfied with a few but well chofen medicines, be thoroughly acquainted with their virtues and efficacy in different conftitutions and difeafes, defpife the cumberfome load of recipes with which practical writers of an inferior rank abound, reject the fo much extolled medicines of the chymifts, and attempt the relief of patients by a proper diet and exercife, and fuch medicines as obfervation and found philofophy recommend: for to the improvement of anatomy and natural philofophy is much of the fuccefs of phyfick to be attributed.

The knowledge of medicines, or fuitable remedies, is alfo highly neceffary to phyficians; who, in order to moderate the impetus in acute diforders, make evacuations, blunt acrimony, dilute too thick fluids, condenfe thofe that are too thin, brace up too lax parts, and relax fuch as are too much conftricted; they alfo drive the humours to parts where they will be leaft prejudicial, upon occafion mitigate pain, and in languors, ufe ftimulating medicines. Wine, vinegar, barley, nitre, honey, rhubarb, opium, and other fimples, are found both fafe and powerful medicines. Sydenham tells us, that all manner of difeafes may be cured by bleeding, purging, with a fubfequent opiate, and proper regimen. In chronical cafes, mineral waters, falts, diaphoreticks, foap, mercury, fteel, with a few vegetables, and proper exercife, will generally effect the cure.

As to the drugs recommended by the ancients, adds Boerhaave, we are, and always fhall be ignorant of them, unlefs perhaps a few; fince they contented themfelves with giving the virtues; omitting the defcription of plants, as things well known. The moderns, on the other hand, have been accurate in the defcriptive part, but have given us very little concerning the virtues of plants, except what they tranfcribed from the ancients, and this upon an uncertain fuppofition of the plants being the fame. To conclude, what is there in the moft elaborate preparation, that is worth half the pains taken about it? Mercury, opium, the Peruvian bark, and other fimples, with fire and water, are acknowledged as the fureft remedies by the ableft mafters of the art; and thefe are found to be more efficacious in that crude ftate, in which bountiful nature has imparted them to us, than after the moft operofe and artificial preparations. We can defpair of nothing, while we follow fimplicity; but the event of intricate labour is fallacious.

As to the general divifions of medicine, they are thefe. 1. Phyfiology, or the doctrine of the animal œconomy, the ufe of the feveral parts, whether folids, veffels, or fluids: under this branch is comprehended anatomy. 2. Hygieine, which lays down rules for the prefervation of health, and the prolongation of life: its objects are chiefly the fix non-naturals. 3. Pathology, or the doctrine of difeafes, their differences, caufes, fymptoms, and other accidents. 4. Semeiotice, is that part of medicine which treats of the figns of difeafes, and their ufe; as alfo how the various degrees and effects of health and ficknefs may be known. 5. Therapeutice, is the laft and principal part, comprehending diet, pharmacy, furgery, and the method of cure; confidering the materia medica, the preparation of remedies, and the manner of ufing them, in order to recover health and banifh difeafes.

Medicines, *Medicamenta, Medicaments*, in phyfick, denote any natural fubftances, applied to the human body, in order to anfwer fome intention of cure.

Medicines are diftinguifhed into internal and external; the former are thofe taken in at the mouth; the latter, which are alfo called topical, are thofe applied outwardly to any particular part of the body.

Medicines, with regard to their operations, are diftinguifhed into agglutinants, alterants, anaftomaticks, aftringents, evacuants, incarnatives, fpecificks, &c.

MEDITERRANEAN, denotes fomething inclofed within land, or remote from the ocean. It more particularly denotes that large fea, which flows between the continents of Europe and Africa, entering by the ftreights of Gibralter, and reaching as far as the Euxine fea and palus Mæotis. It was formerly called the Græcian or Great fea; but now it is denominated varioufly according to the countries adjacent thereto.

MEDITULLIUM, in anatomy, fignifies the fpongy fubftance contained betwixt the two tables of the fkull, otherwife called diploe. It alfo imports the pith of vegetables.

MEDIUM, the fame with mean or mediate.

Medium, in logick, or the mean or middle term of a fyllogifm, is an argument or confideration, for which we affirm or deny any thing: or, it is the caufe why the greater extreme is affirmed or denied of the lefs in the conclufion. Thus every good is to be defired; but all virtue is good; therefore, all virtue is to be defired; here good is the medium, virtue the lefs extreme, and to be defired the greater.

It is called medium, as being a kind of mean between the fubject and predicate; or by reafon the extremes are fo difpofed, as to affirm or deny by means thereof.

The only way of coming at mediums is by a clofe attention to clear ideas.

Medium, in arithmetick, or an *arithmetical* Mean, in the fchools called medium rei, is that which is equally diftant from each extreme, or which exceeds the lefs extreme, as much as it is exceeded by the greater, in refpect of quantity, not proportion. See Progression.

Geometrical Medium, called medium perfonæ, is that where the fame ratio is preferved between the firft and fecond, as between the fecond and third terms. Thus fix is a medium between four and nine. See Progression.

Diftribute juftice and virtue, obferve a geometrical mean; and communicative juftice an arithmetical one.

Medium in philofophy, that fpace or region through which a body in motion paffes to any point; thus æther is fuppofed to be the medium through which the heavenly bodies move; air wherein bodies move near our earth, &c. That denfity in the parts of the medium, whereby the motion of bodies in it is retarded, is called its refiftance, which, together with the force of gravity is the caufe of the ceffation of projectiles.

Subtile or *Æthereal* Medium. See Æther.

MEDULLA, marrow, an oleaginous fubftance contained in the cavities of the bones of animals.

Medulla *Oblongata*, in anatomy, the lower and medullary part of the cerebrum and cerebellum, formed into a kind of tail and extended to the great foramen or pole in the occipital bone of the cranium, where it gives origin to the fpinal marrow and to the nerves of the brain.

Medulla *Spinalis*, or fpinal marrow, is a continuation of the medulla oblongata of the brain, and forms, as it were, a tail to that part. It is included in a kind of bony canal, formed by the vertebræ, and in this is continued from the head to the extremity of the os facrum. Its length is therefore the fame with that of the fpina dorfi, which is different in perfons of different ftature. Its thicknefs, in general, is nearly equal to that of a finger; but it is not uniformly of the fame diameter throughout. Its fubftance, in the upper part, as far as to the laft vertebra of the thorax, is the fame with that of the medulla oblongata of the brain, but fomewhat tougher and more firm: they are externally of a medullary fubftance, that the nerves may eafily make their way out; internally cineritious, and of the fame nature with the cineritious or cortical part of the brain but the lower part of them, from the laft vertebra of the thorax to the extremity of the os facrum, is fibrous and very tenacious, and is called cauda equina. The di-

viſion of the ſpinal marrow is formed by means of a fiſſure; it is by this ſeparated into a right and left part, or into two columns; but this ſeparation is not continued to the centre. Its proper integuments are no leſs than ſix: theſe are, 1. The bony canal, formed by the cavities of the 24 vertebræ, and the os ſacrum: 2. The tunica, which is very ſtrong, and connects the vertebræ within: 3. The cellular, or adipoſe, coat, which in fat perſons, always contains more or leſs fat, and ſeems deſtined by nature to ſoften the former: 4. The dura mater, which is ſtronger in the upper-part, and finer and weaker in the lower: this looſely incloſes the medulla in the ſpine, and in its anterior part is firmly connected with the vertebræ: 5. The tunica arachnoides, which in its anterior part, adheres very firmly to the pia mater, but in its poſterior part is looſe and fluctuating: 6. The pia mater, which ſurrounds every part of the ſpinal marrow, and all the nerves that ariſe from it, and enters alſo its longitudinal diviſion. The arteries and veins of the ſpinal marrow enter at the apertures of the vertebræ which give paſſage out to the nerves; they make a multitude of anaſtomoſes, and are derived from the vertebrals of the neck, the intercoſtals and the lumbar. The nerves of the ſpine are 31, or as others count them, 32 pair. Theſe are compoſed each of a multitude of fibres, ariſing from the anterior and poſterior parts of the medulla: theſe fibres afterwards unite, and are connected by, and covered with membranes, and in that ſtate they conſtitute what we call nerves.

The uſes of the ſpinal marrow are, to give origin to the before-mentioned pairs of nerves, which are principally diſtributed to the limbs and external parts; and to ſecrete and prepare a nervous fluid.

MEDUSA's Head, in aſtronomy. See Algol.

Medusa's Head, in botany, the Engliſh name for a ſpecies of euphorbium. See Euphorbium.

MELANCHOLY, in medicine, a ſpecies of madneſs, being a kind of delirium without a fever, uſually attended with fear, heavineſs, and ſorrow, without any apparent cauſe. It is infinitely varied according to the temperament and ideas of the perſon affected therewith.

Under erratick melancholy, the patients are in continual motion, ſhun company, love ſolitary places, and know not whither they wander. The colour of the body is yellowiſh; the tongue dry like that of a perſon ſcorched with thirſt, the eyes dry, hollow, and never diſcharging any tears; the whole body dry and parched; and the countenance overcaſt with gloom, horror, and ſadneſs. Such melancholy patients are more timorous than others; for which reaſon they love ſolitude, wander in the night, and ſeek for concealment about the ſepulchres of the dead, and other ſolitary places. They endeavour not to meet human creatures, and, if they ſhould unexpectedly do ſo, they do not look at them, nor ſee them; which is undoubtedly owing to their unaccountable dread and fear, in conſequence of which they ſuſpect and ſhun every thing; or becauſe they do not advert to external objects, ſince their fancies are always employed and their thoughts continually dwelling on the repreſentations of their fancies.

Their legs are generally full of ulcers, which cannot be conſolidated, ſince, by the continual motion, the peccant humour is ſollicited to the legs.

The cure is almoſt the ſame with that of common melancholy, ſince it proceeds from the ſame cauſe, and only differs in degree, and the commixture of the humours. For this reaſon the melancholick humour, which affects the ſpirits in the head, and diſpoſes the brain to the generation of the like ſpirits, is to be corrected and evacuated. Then the head is to be corroborated, and its intemperature reduced to a due ſtate, by moiſtening and moderate heating, or rather temperate cephalicks. In this diſeaſe copious veneſection is uſeful, either at one time, or repeated intervals, as the condition of the patient requires. But above all things ſleep is to be carefully procured, ſince nothing contributes more to the removal of this diſorder. Purgative medicines are alſo to be frequently repeated.

The oppoſite of this erratick melancholy is the apoplectick melancholy; for, as in the former the patients are reſtleſs and wander about from place to place, ſo in the latter every circumſtance is reverſed; for the patients appear ſtupid, and, being apparently deſtitute of a locomotive quality, ſeem to be fixed to a particular place. When they lie, they care not for erecting themſelves; when they ſit, they care not for riſing; and, when they ſtand, they will not walk, except forced to it.

They do not ſhun men; but, though they ſeem attentive to what is ſaid to them, yet they make no anſwer to it, and being penſive and wrapped up in the contemplation of other things, they do not attend to the objects of ſight and touch. They ſleep and watch by intervals, eat their aliments when held to their mouths, drink like other people, and in theſe and the like things are pretty tractable, and eaſily managed.

There is a great difference between a catoche and apoplectick melancholy; ſince the former generally ſeizes the patient ſuddenly, whilſt the latter invades ſlowly. In the former the patient is deprived of ſenſation and motion; whereas, in apoplectick melancholy, both theſe are retained, though the patient cannot uſe his ſenſes ſo quickly as ſound perſons do; becauſe their fancy, being employed on certain objects, cannot advert to others. In a catoche the patients ſometimes neither hear, ſee, nor feel; whereas, in apoplectick melancholy, they do all theſe, though they do not teſtify in words, that they do ſo. In a catoche the patients generally have their members retained in the ſtate and poſition they are placed by the by-ſtanders; whereas, in apoplectick melancholy, the patient is capable of moving his members. Thoſe alſo which labour under a catoche have their eyes open and cannot ſpeak, which ſymptom is not obſerved in apoplectick melancholy.

MELANOGOGUES, ſuch medicines as are ſuppoſed to be peculiarly adapted to purge off black bile or choler.

MELILOT, *Melilotus*, in botany, a plant with ſmooth oval ſerrated leaves, ſtanding three together, on ſlender pedicles, and round, ſtriated, branched ſtalks, terminated by long ſpikes of papilionaceous flowers drooping downwards, which are followed by ſhort thick wrinkled pods, containing each one or two roundiſh ſeeds. It is annual or biennial, and found in flower, in hedges and corn fields, the greateſt part of the ſummer.

Melilot has been ſaid to be reſolvent, emollient, anodyne, and to participate of the virtues of chamomile. In its ſenſible qualities it differs very materially from that plant; its taſte is unpleaſant, ſubacrid, ſubſaline, but not bitter: when freſh, it has ſcarcely any ſmell; in drying, it acquires a pretty ſtrong one, of the aromatick kind, but not agreeable. The principal uſe of the plant has been in clyſters, fomentations, and other external applications: it formerly gave name to one of the officinal plaſters; which received from the melilot a green colour and an unpleaſant ſmell, without any addition to its efficacy.

MELISSA, baum, in botany. See Baum.

MELODY, in muſick, the agreeable effect of different ſounds, ranged and diſpoſed in ſucceſſion; ſo that melody is the effect of a ſingle voice or inſtrument, by which it is diſtinguiſhed from harmony. See Harmony.

MELON, in botany, makes a diſtinct genus of plants, the flowers of which conſiſt only of one leaf each, and are wide at the mouth, and divided into ſeveral ſegments, wholly reſembling the flowers of cucumbers: of theſe alſo, ſome are male or ſterile flowers, having no embryo fruit; others are fruitful or female flowers, having an embryo, which ripens into a large fruit of an oval figure, ſometimes ſmooth, ſometimes rough, divided into three cells, and containing oblong ſeeds; each of theſe cells ſeems alſo to be divided into two.

There are great varieties of melons, but the beſt ſorts we know of are the Romana and Cantalope melons, ſo called from the places where they have been firſt propagated in Europe, though they originally came from ſome parts of Aſia. They are raiſed on hot beds, nearly in the ſame manner as thoſe of cucumbers; but the earth in which they grow, ſhould be much ſtronger, and not more than two plants to one light; theſe, as they advance in growth, ſhould be trained thin and regularly, ſo as to prevent confuſion among the branches, being previouſly pinched off at the ſecond joint, which produces lateral ſhoots, whoſe extremities ſhould alſo be pinched off when they have five or ſix joints; this will occaſion freſh branches to iſſue forth, which produce the fruit; theſe branches ſhould likewiſe be pinched off at the

the joint beyond the fruit, which will help to ſet them, they being very liable, in bad weather, to turn yellow and come to nought; therefore, they are not ſet with certainty till they are arrived to the ſize of a hen's egg. Some, to ſet the fruit, uſe the method of taking the male flower, and ſtriking its farina into the eye of the female flower, in order to impregnate the fruit, which is very proper, particularly to thoſe early-raiſed plants, that can admit of but a ſmall ſhare of air being given them on account of its coldneſs.

The fruit, when fully grown, ſhould be often noticed for their being cut at a proper time, which is known by the ſtalk cracking round the parts which join to the fruit, as likewiſe by the ſmell; but for thoſe kinds of Cantaloupe melons whoſe rinds are thick, it is neceſſary to let them be on the branch a day longer than the other ſorts after they have ſhewn the marks of ripeneſs; and if they are cut early in the morning, before the ſun has warmed them, they will be much higher flavoured.

It may be neceſſary to obſerve, that the larger the glaſſes are, the better it will be for the plants, and the greater number of fruit will be obtained, which will alſo be larger and richer flavoured than thoſe raiſed in the contracted glaſſes commonly uſed, which are not above four feet and a half in depth, which greatly prevents the plants from extending themſelves, and makes it neceſſary either to pinch them too cloſe, to keep them within the frame, or elſe the box muſt be raiſed to let them out underneath when the ſeaſon will not admit of it, but this is to be underſtood of thoſe which are raiſed in February or March; about ſix feet is a very good width for a melon-frame.

The firſt ſeaſon for ſowing melon-ſeeds is in January, and the laſt the latter end of April or beginning of May. The ſeeds of melons are reckoned among the greater cold ſeeds; they are eſteemed cooling and diuretick; they ſerve to make emulſions, but at preſent they are not ſo much noticed as formerly.

MELONGENA, Mad-Apple, in botany, a genus of plants, whoſe flower is monopetalous, with a ſhort tube, and the limb cut into five ſegments, which are plicated and reflexed; the ſtamina are five ſmall ſubulated filaments; terminated by oblong connivent antheræ. The fruit is a ſmooth, egg-ſhaped berry, with a fleſhy pulp, having one cell, which contains a number of roundiſh compreſſed ſeeds. A ſpecies whoſe fruit is white and much reſembling an egg, is raiſed with us in the ſpring, on a common hot-bed, from ſeed, and afterwards tranſplanted in borders or pots as other annual plants are; theſe are preſerved merely for the ſhew of the fruit; but in the warm parts of the globe they are eaten as a delicacy, which not in the leaſt ſuits an Engliſh palate.

MELON-Thistle, *Cactus*, in botany, a genus of plants ſhaped like a melon, with deep ribs beſet with ſtrong ſpines, and of a green colour; ſome of which are crowned with a prickly brown cap, which gives them a ſingular appearance. The flower is hexapetalous, and ſpreads open at the top, and the fruit is a fleſhy berry with one cell, containing a number of angular ſeeds. Theſe plants are natives of the warmeſt parts of America.

MEMBRANE, in anatomy, a pliable texture of fibres, interwoven together in the ſame plane. The membranes differ in thickneſs, according to the ſmallneſs of their fibres, or the number of their planes. Theſe particular planes are termed laminæ, and are diſtinguiſhed into internal, external, and middle. The difference of membranes, in general, depends on that of the fibres of which they are compoſed. Small portions of membranes, eſpecially when they are very thin, are called pellicles, and called the cellular or ſpongy ſubſtance.

MEMBRANOSUS, in anatomy, a muſcle otherwiſe called faſcia lata.

MEMOIRS, in matters of literature, a ſpecies of hiſtory, written by perſons who had ſome ſhare in the tranſactions they relate, anſwering to what the Romans call Commentarii, commentaries.

MEMORY, *Memoria*, a faculty of the human mind, whereby it retains or keeps the ideas it has once perceived. See Idea.

Memory (ſays Mr. Locke) is, as it were, the ſtorehouſe of our ideas; for the narrow mind of a man not being capable of having many ideas under view at once, it was neceſſary to have a repoſitory, in which to lay up thoſe ideas which it may afterwards have uſe of. But our ideas being nothing but actual perceptions in the mind, which ceaſe to be any thing where there is no perception of them; this laying up of our ideas in the repoſitory of the memory, ſignifies no more than this, that the mind has a power, in many caſes, to revive perceptions it has once had, with this additional perception annexed to them, that it has had them before.

And it is by the aſſiſtance of this faculty, that we are ſaid to have all thoſe ideas in our underſtandings which we can bring in ſight, and make the ſubjects of our thoughts, without the help of thoſe ſenſible qualities which firſt imprinted them there.

Attention and repetition help much to the fixing ideas in our memories: but thoſe which make the deepeſt and moſt laſting impreſſions, are thoſe which are accompanied with pleaſure and pain. Ideas but once taken in, and never again repeated, are ſoon loſt; as thoſe of colours, in ſuch as loſt their ſight when very young.

MENDICANTS, or begging friars, ſeveral orders of religious in Popiſh countries, who having no ſettled revenues, are ſupported by the charitable contributions they receive from others.

MENIALS, in law books, domeſtick or houſhold-ſervants, who live under their lord or maſter's roof.

MENINGES, or Menynges, in anatomy, a name given to the dura and pia mater of the brain. See Dura Mater, &c.

MENIPPEAN, in poetry, a kind of ſatyr, conſiſting of proſe and verſe intermixed.

MENISCUS, in opticks, a lens convex on one ſide, and concave on the other. See Lens. For finding the focus of a meniſcus, the rule is: as the difference of the ſemidiameters of the concavity and convexity, to the ſemidiameter of the concavity; ſo is the diameter of the convexity to the focal diſtance.

MENISPERMUM, Virginian ivy, in botany, a genus of the hexandria trigynia claſs of plants, the corolla whereof conſiſts of ſix ovato-oblong, obtuſe, hollow, erecto-patent petals; the fruit is compoſed of three oval berries, each containing a ſingle cell, and in it a large, ſingle, lunated, compreſſed ſeed. It is to be obſerved, that the parts of fructification vary extremely in this genus.

MENNONITES, a ſect of baptiſts in Holland, ſo called from Mennon Simonis of Friezland, who lived in the ſixteenth century. This ſect believe, that the New Teſtament is the only rule of faith; that the terms Perſon and Trinity are not to be uſed in ſpeaking of the Father, Son, and Holy Ghoſt; that the firſt man was not created perfect; that it is unlawful to ſwear or to wage war upon any occaſion; that infants are not the proper ſubjects of baptiſm; and the miniſters of the goſpel ought to receive no ſalary.

MENOLOGY, the Greek calendar, in which the lives of the ſaints in ſhort, or barely their names, are cited; anſwering nearly to the martyrology of the Latin church. See Martyrology.

MENSES, Fluors, Courses, *Catamenia*, in medicine, the monthly evacuations from the uterus of women not with child and not giving ſuck.

Among the natural actions which prepare proper juices and matter for carrying on the vital motions, may be reckoned this menſtrual purgation of women, ſince by means thereof the ſuperfluous and redundant blood is evacuated, that what remains in the veins may circulate with greater freedom, and be the more effectually depurated. This evacuation is occaſioned by the redundance of that fluid in women and the peculiar ſtructure of the uterus; and as it is of great importance to health, ſo it is the means by which the fœtus is nouriſhed. The ancient phyſicians, and the generality of the modern ones, aſcribe the periodical return of this flux to the influence of the moon, or to the lunar phaſes. The quantity of blood thus evacuated cannot be exactly and accurately aſcertained, for it varies in women of different ages, methods of life, and conſtitutions.

Suppreſſion of the Menses. Boerhaave obſerves, that in a ſuppreſſion of the menſes there is a plethora, with a liſtleſſneſs of motion, a heavineſs, a paleneſs, a pain of the loins and of the groin; all the functions, whether natural, vital, or animal, are depraved; ſometimes the menſes will force a way through the eyes, ears, noſtrils,

gums,

gums, the falival ducts, the œfophagus, from the alvus, bladder, breafts, fkin, wounds or ulcers. Hence often arifes a depravation of all the vifcera, as alfo difeafes without number, partly from a putrefaction already begun, and partly from the hurt which the veffels have received.

Things which retard the menfes are immoderate cold, forrow, a fudden fright, too great evacuations, incraffating diet, a crudity of the humours, acids, and aftringent medicines.

This diforder, according to Sydenham, is to be cured in the fame manner as the hyfterick affection, but if the remedies for that fail, the patient muft take every morning five fpoonfuls of hyfterick julap with twelve drops of fpirit of hartfhorn; and every night one fcruple of powder of myrrh camphorated, made into a bolus or pills with the firup of orange peels. Allen recommends cantharides and camphor: the dofe is from two grains to fix. Hoffman directs chalybeats, or pills made of aloes, myrrh, faffron, amber, caftor, and round birthwort. Pitcairn thinks mercury more efficacious than fteel. If the fluids are inclinable to ftagnate, their fluidity may be preferved by fomentations and frictions of the feet, by opening a vein in the foot, and bleeding elfewhere, by giving uterine purges, by emenagogues, by plafters, fomentations, liniments, vapours and heat, by ftrengthning the veffels debilitated with a plethora by chalybeats and aftringents. See the articles FOMENTATION, FRICTION, LINIMENT, &c.

MENSTRUUM, or DISSOLVENT, in chymiftry, a body which, when artificially applied to another, divides its fubtility, fo that the particles of the folvent remain thoroughly intermixed with thofe of the folvend.

It was called a menftruum, becaufe the chymifts, in its application to the folvend, firft ufed a moderate fire, for a philofophical month, or forty days; and hence arofe the name of menftrual folvent, at length barely a menftruum.

It is the property of a menftruum to be itfelf equally diffolved, when it diffolves the folvend; but when the folution is perfected, it may fometimes happen that the folvent and folvend fhall feparate. The divided parts, therefore, of the folvent, muft infinuate itfelf among the parts of the folvend, fo as to divide and diffolve the body. Hence it appears, that the actions of menftruum differ from all mechanical feparations, where the inftrument, fuch as a knife, fword, or faw, while it divides, is not itfelf divided, but remains almoft entire. But there is fome reafon to fufpect, that the fingle particles of a menftruum act like mechanical inftruments, by the properties of their own proper fize, figure, hardnefs, and gravity. Every menftruum, while it diffolves, is neceffarily divided into invifible particles, and muft therefore be fluid in the action; and when the diffolution is completed, the folvent and folvend muft become one fluid.

Cuftom has given the name of menftruums to many bodies of a hard and confiftent nature, though in that ftate they cannot act as folvents; and hence the chymifts have divided menftruums into folid and fluid.

Dry or folid menftruums may be again divided into five claffes, which, according to Boerhaave, are as follow: 1. The fix metals, gold, lead, filver, copper, iron, and tin, which act upon one another after being fufed in the fire, and may be intimately mixed, fo as to make an apparently homogeneous mafs, every particle of which holds the fame proportion of a different metal as the whole: for if ten ounces of filver be thus mixed with an ounce of gold, and a grain of this mafs be given to an affay-mafter, he will difcover that it contains one eleventh part gold, and ten parts filver. 2. The femi-metals, as antimony, bifmuth, cinnabar, marcafites, and zinck, which, when melted, mix with one another or with metals; but when thus mixed they are no longer malleable, but may eafily be reduced to powder. 3. The dry falts, as alum, borax, nitre, fal-ammoniack, fea-falt, vitriol, fixed alkali, and mercury fublimate, which may be fubtilly divided by fire, and intimately mix with one another, with metals, femi-metals, and other things. 4. Hard foffile fulphureous bodies, as fulphur vivum, common brimftone, arfenick, orpiment and cobalt. 5. The foffile bodies, called by refiners cements, which confift of falts, fulphur, and brick, reduced to dry powders, and ftrewed betwixt plates of metals, in order to raife their colour, or feparate one metal from another.

Some menftruums being left to themfelves, after folution concrete into a hard mafs, which, though compounded, appears of an uniform fimple nature. In this manner, if melted lead be mixed with tin, they unite, as water with water, or mercury with mercury. The cafe is the fame in all the metals, and in fome of the femi-metals. Thus if a fcruple of regulus of antimony be added to a pound of melted tin, the mafs when cold will appear uniform, but become entirely brittle; fo fixed alkali unites with fand in the fire; and fulphur and mercury, by being ground together, turn to a black and dry powder, which being fublimed produces an apparent fimple body, called cinnabar. Many become an hard, and fometimes a dry body. Thus almoft all the menftruums of metals unite with their refpective metals into folid vitriols: and thus ftrong diftilled vinegar, when it has diffolved fhells, chalk, and ftony fubftances, feparates from its water, and together with the body it diffolves, forms a dry hard mafs.

Numerous menftruums have a liquid form before they act as folvents; as vinegar, water, faline, acid, alcaline and compounded fpirits, alcaline oils per deliquium, &c. Some menftruums become liquid after the folution, and continue fo with the folvent. Thus in the diffolution of five of the metals with fimple mercury a foft pafte is produced, which may indefinitely be diluted by the addition of more mercury; but there is fcarcely any known method of reftoring this amalgama to its folidity. All the liquid menftruums, after having diffolved metals in a large proportion, cannot eafily be dried; whence many have imagined thefe folutions to be fixed metallick oils, and in vain fought fecrets in them.

It is now eafy to obferve that many menftruums unite bodies as well as feparate them; for frequently after the diffolution the particles of the menftruum prefently join with thofe of the folvent, and produce a new compound, often very different from the nature of the fimple refolved body. The parts however of the folvent, after its concretion, no longer touch one another, but are feparated by the interpofition of the particles of the matter diffolved: and the particles which before conftituted the folvend are feparated by the interpofition of the particles of the folvent. Hence it is plain that the parts of the menftruums apply themfelves to the parts of the folvend; and a certain caufe is here required to make the particles of the folvent fly from one another and approach the particles of the folvend, rather than remain in their former fituation The like caufe feems to be required to make the particles of the folvend, now feparated, remain united with the parts of the menftruum, rather than fuffer the diffolving and diffolved particles to unite by their natural affinity into homogeneous bodies. This caufe muft be fought in the folvend as well as in the folvent, for the action is reciprocal. Thus while aqua regia diffolves thrice its weight of gold into a yellow liquor, the particles of gold are united with the aqua regia, and remain fufpended in it, though gold be eighteen times heavier than aqua regia. Whence there muft be a mutual correfponding power between the particles of the gold and aqua regia, whereby they act upon, embrace and detain each other, otherwife the particles of gold would fall to the bottom, the faline particles reft upon them, and the water float over both. If we were to deduce the caufe from fimilitude of fubftance, the action of diffolution feems to be performed by a certain power of the parts of the menftruum to attract the diffolving parts rather than to repel them; and is not a mechanical action, or unfriendly commotion, but rather an appetite of union. Thus, in a violent folution, the agitation, heat, hiffing and tumult ceafe when all the parts of the folvend have united with thofe of the folvent, as appears in throwing a piece of iron into weak aqua fortis.

The whole folvent never acts at once on the whole folvend, only thofe particles of the folvent which touch fome others of the folvend act firft; and thefe being feparated, frefh particles of the menftruum apply themfelves to others of the folvend: therefore part of the menftruum acts upon that part of the body which it ftrikes off and feparates; but the conflict made in this feparation excites a greater motion in the menftruum, by which means other parts of the menftruums are agitated and applied to other parts of the folvend.

Fire excites, promotes, and increafes the action of menftruums; for in extreme cold folutions are either not

made

made or made but flowly, but they are foon performed by the affiftance of heat: fome menftruums require a ftrong heat, as mercury, before it will diffolve metals: fome a fmaller; thus fal armoniack, fea-falt, and falt of tartar eafily diffolve in water: fome menftruums act with a moderate heat, but lofe their diffolving power, or even acquire a power of coagulating, by a ftronger; thus warm water diffolves the white of eggs, which boiling coagulates. This effect of fire feems to be produced, 1. By impelling, moving and agitating the menftruum in the manner of a mere mechanical motion. 2. By its general power of expanding the fubftance of all bodies. 3. By feparating the parts fo as to fet them further afunder. In moft cafes the heat is increafed during the folution, and even the action of thofe menftruums is augmented by heat, which generate a great degree of cold in the folution; thus fal ammoniack diffolves fooneft in warm water.

Sir Ifaac Newton accounts for the action of menftruums, from the acids wherewith they are impregnated, which are found to be endued with a ftrong attractive force, wherein their activity confifts. See ACID.

MENSTRUUM, in pharmacy, chiefly denotes a body that will extract the virtues of ingredients by fufion, decoction, &c.

MENSTRUUM *Peracutum*, a menftruum which Mr. Boyle extracted from bread only, that would prey even on glafs, and perform many things which aqua-fortis would not.

With this he drew tinctures from coral, lapis hæmatites, granates, diamonds, and rubies.

Univerfal MENSTRUUM. See ALKAHEST.

MENSURATION, *Menfuratio*, in general denotes the act or art of meafuring lines, fuperficies, or folids.

MENTHA, Mint, in botany. See MINT.

MENTZELIA, in botany, a genus of plants, whofe flower confifts of five patent petals, with many fetaceous erect ftamina: the fruit is a long cylindraceous capfule, with one cell, containing many fmall feeds.

MERCATOR's CHART, a projection of the earth's fuperficies in plano, where the meridians are ftraight lines, parallel to, and equidiftant from, each other. The parallels of latitude are alfo ftraight lines, and parallel to one another, but the diftance between them increafes from the equinoctial towards either pole, in the ratio of the fecant of the latitude to the radius. See *Mercator's* SAILING.

MERCHANT, a perfon who buys and fells commodities in grofs, or deals in exchanges; or that trafficks in the way of commerce, either by importation or exportation. Formerly, every one that was a buyer or feller in the retail way, was called a merchant, as they ftill are both in France and Holland; but here, fhopkeepers, or thofe who attend fairs or markets, have loft that appellation.

MERCURIAL, fomething confifting of, or relating to, mercury.

MERCURIALS, MERCURY, in botany, a genus of the dioecia-hexandria clafs of plants, with an apetalous flower, confifting only of ftamina: the fruit is a large trilocular capfule, with two compreffed feeds in each cell.

MERCURIFICATION, in chymiftry, the method of feparating the mercuries of metals, which is moft eafily effected by means of a burning-glafs; for the metal being placed in its focus, its mercurial parts are faid to fly off in fmoke, which when condenfed and collected, appears to be true quickfilver.

MERCURY, in natural hiftory, a femi-metal naturally fluid, and the heavieft of all known bodies except gold: it is fo perfectly homogeneous and fimple in its nature, that it is a queftion whether gold itfelf be more fo: when perfectly purified, it appears the fame in all its parts, as far as our utmoft tefts can go, till we come to that fevere trial, the folar fire. It penetrates the parts of all the other metals, renders them brittle, and in part diffolves them. It is wholly volatile in the fire, and may be driven up in vapour by a degree of heat very little greater than that of boiling water. It is the leaft tenacious of all known bodies, for its parts feparate into more minute ones of the fame figure, with the fmalleft force.

It is, indeed, the moft divifible of all bodies, for the vapour, in form of which it rifes in evaporation, is almoft too thin to be diftinguifhed from the ambient air, yet this is pure unaltered mercury; for if it is received into cold water, it forms itfelf again into regular round drops. Notwithftanding a fmall heat ferves to evaporate mercury, yet if it be kept in a degree fmaller than that, in a veffel carefully clofed, a long continuance of that heat will reduce it to a red calx in form of powder, and this may be again revived into fluid mercury by a gentle heat given it in ftratification with charcoal-duft. If it be placed in its crude ftate in the focus of a great burning glafs, it is immediately diffipated in fumes, and leaves no remainder: but if inftead of crude mercury, this red calx be ufed, it runs into a kind of glafs, and immediately afterwards evaporates, leaving a fmall quantity of dufky powder behind, which, on being further urged by the fame intenfe heat, vitrifies and flies off as the other part had done: but if this calx be expofed upon a piece of charcoal, the effect is the fame, as in giving it the heat of a common fire with charcoal-duft, it runs into liquid mercury, and immediately afterwards evaporates.

It appears, therefore, that mercury, fimple as it feems to be, is compofed of a vitrifiable earth, and a fulphur, which laft gives it the brightnefs and appearance of metal; for when robbed of this, it ceafes to be bright and metalline, and again recovers thofe qualities on its being added again, though from no other fubftance than charcoal. It is poffible to calcine mercury to fuch a degree, that it fhall bear heating red-hot in a crucible without evaporation. The penetrating power of mercury is fo great, that in falivations, any thing of gold worn by the perfons, will be amalgamated with the fumes of it paffing through the fkin, and will be rendered white and foft by it.

It diffolves very readily in the ftronger acid menftrua, and what is very fingular, in aqua fortis and aqua regia indifferently, while the other metals in general that are foluble in one of thefe, are not to be affected by the other. With oil of vitriol, it yields us the yellow emetick powder called turbith mineral; and with fpirit of fea-falt, corrofive fublimate. The fpecifick gravity of pure mercury is to water as 14020 to 1000; and as it is the heavieft of all fluids, it is alfo the coldeft; common water is much more cold to the touch, under the fame circumftances, than fpirit of wine, and confequently, mercury than either; and when heated, mercury is in an equal degree the hotteft of all fluids; that heat, which given to water would fcarce be felt by the flefh, will burn it if given to mercury.

Mercury readily mixes with gold, filver, lead and tin, among the metals, and with zink and bifmuth, among the femi-metals. See AMALGAMATION.

But notwithftanding this, it does not eafily blend with any other fubftance, except by the means of fire, or of trituration: by either of thefe methods, it may be blended intimately with fulphur; by the former, into a red matter; by the latter, into a black powder, called Æthiop's mineral. No drug ought to be fo carefully examined as to its purity as mercury, as none is fo frequently fophifticated. The weighing it hydroftatically is the fureft of all means to find out this adulteration; or it may be difcovered by evaporating a little of it, to try if any thing will remain behind: or when it is adulterated in the common way with lead, by grinding it in a mortar with vinegar. This mild acid is a menftruum for lead, though not for mercury, and confequently if there has been lead mixed among the mercury, it will grow fweet to the tafte, but if the mercury be pure, it will remain unaltered.

The ores of mercury are of various kinds, but the moft general one is known by the name of cinnabar, which very readily parts with its quickfilver, on its being diftilled in a glafs retort, with the addition of quick lime or iron-filings. In many places it is feparated by burying certain earthen veffels in the earth, and inverting into them others containing cinnabar, and ftopped with a bundle of mofs; when a fire being made about thefe, the quickfilver runs through the mofs, and is faved in the under veffel. The fulphur is not fo eafily feparated from this mineral in its proper form, but if it be boiled in a ftrong lixivium of wood-afhes, and diftilled vinegar be added to the clear liquor, it will be precipitated.

Mercury is not only found in cinnabar, and other ores, but is fometimes met with in its pure and fluid ftate, lodged in the accidental cavities of hard ftone; for when the

the workmen who ſearch for its ore accidentally break into theſe cavities, it runs out like water. The unhappy creatures who work in theſe mines ſeldom live more than three or four years, and then die in a moſt miſerable manner; and the people who work it in any other manner in abundance, and for a conſtancy, are as certain of miſchief from it, being always afflicted with palſies and tremblings of the limbs. We have alſo had abundant experience from the common mercurial unguents, and from the method of taking it internally, that when proper care has not been taken, terrible conſequences have enſued. But, under proper regulations, it is a moſt powerful and noble medicine.

Crude mercury is a principal ingredient in many compoſitions of the ſhops, and given with ſucceſs in the moſt ſtubborn diſorders.

Preparations of MERCURY. The chief preparations of mercury now in uſe are the following: 1. Æthiops mineral: 2. Factitious cinnabar: 3. Turbith mineral: 4. White precipitate: 5. Corroſive mercury ſublimate: 6. Mercurius calcinatus, commonly called precipitate per ſe: 7. Red mercurial corroſive: 8. Coralline mercury: and, 9. Mercurius dulcis.

Corroſive mercury ſublimate, or white corroſive mercury, is prepared in the following manner: take of purified mercury, 40 ounces; of ſea-ſalt, 33 ounces; of nitre, 28 ounces; and of calcined green vitriol, 66 ounces. Rub the quickſilver firſt in an ounce or more of corroſive ſublimate, in a wooden or ſtone veſſel, till it be broken into ſmall grains; then mix with it the nitre, afterwards the ſea-ſalt, till the mercury quite diſappears; laſtly, add the calcined vitriol, but do not rub the mixture too long with it, leſt the quickſilver ſhould begin to part again; put the whole into a matraſs with an alembick-head, and ſublime it. The corroſive ſublimate will be found in the head, and a ſpirit in a ſmall quantity will run into the receiver. This is a terrible poiſon, and corrodes every part it touches as it goes down into the ſtomach; it is therefore only uſed externally, for eating down proud fleſh, and cleanſing old and foul ulcers. Mercurius calcinatus, or calcined mercury, commonly called precipitate per ſe, is thus prepared: ſet purified mercury upon a ſand-heat for ſeveral months, in a glaſs veſſel with a broad bottom, and a ſmall aperture to let in the air, till it be reduced to a red powder. This preparation is in great eſteem in all caſes in which mercurials are proper: two or three grains are generally given for a doſe. Red mercurial corroſive, improperly called red precipitate, is thus prepared: take any quantity of purified mercury, put it into a flat-bottomed glaſs, and add to it an equal quantity in weight of aqua-fortis: ſet the mixture in a ſand-heat till all the moiſture is evaporated, and the maſs at bottom has acquired a fine red colour. This is a mild eſcharotick, and is uſed in eating down carnoſities and proud fleſh in ulcers, which it performs with very little pain.

Coralline mercury, or arcanum corallinum, is thus prepared; pour upon the mercurial red corroſive thrice its weight of rectified ſpirit of wine, and digeſt them together two or three days in a gentle heat, often ſhaking the veſſel; then ſet fire to the ſpirit, ſtirring the powder continually till the ſpirit is quite burnt away. This powder is given in ſmall doſes of two or three grains.

MERCURY, ☿, in aſtronomy, the ſmalleſt of the planets, and the neareſt the ſun. See PLANET. Its mean diſtance from the ſun is 387 of ſuch parts of which the earth is 1000, its excentricity is 80 of ſuch parts. The inclination of its orbit is 6° 54′; it performs its revolution round the ſun in 87 days, 23 hours, 16′; its greateſt elongation is about 28° 46′. The place in the ecliptick for the aſcending node is in 14° 42′ of Taurus. Its diameter to that of the earth is as 3 to 4: and therefore the globe of Mercury will be to that of the earth as 2 to 5.

Mercury, in the ſame manner as Venus, always keeps himſelf in the neighbourhood of the ſun, and never recedes from him ſo far as Venus does; he hides himſelf ſo much in the ſplendor of the ſun's rays, that he is but ſeldom ſeen by us on the earth: but ſince the invention of teleſcopes, he has been frequently obſerved, when in conjunction with the ſun, to paſs over his diſk like a black ſpot. The exceeding brightneſs by which Mercury outſhines all the planets, does evidently prove him to be much nearer the ſun than any of the reſt; for the nearer any body is to the ſun, the greater illuſtration it receives from him. From all this it is evident, that Mercury does likewiſe go round the ſun in a leſs orbit, included within the orbit of Venus.

Mr. Azout pretends that, though Mercury is ſo near the ſun, the light there is not capable of burning any objects. But Sir Iſaac Newton makes the heat of Mercury ſo great, as to be ſeven times as much as the heat of our ſummer ſun; which he found, by experiments deſignedly made by the thermometer, is enough to make water boil. And, therefore, if bodies will not be there enkindled by ſuch a degree of heat, it muſt be becauſe their degree of denſity is proportionably greater than that of ſuch kinds of bodies on our earth: wherefore, undoubtedly, this fiery planet is uninhabitable by ſuch creatures as live on our earth.

Dr. Halley, in his obſervations of Mercury ſeen in the ſun, A. D. 1677, at St. Helena, ſaith, that this planet may be ſeen nine times in the ſun, near the aſcending node, A. D. 1710, 1723, 1736, 1743, 1756, 1769, 1776, 1782, 1789, in October; and four times near the other node, in the month of April, A. D. 1707, 1753, 1786, 1799; all within this century.

MERCURY, in heraldry, denotes the purple colour in the arms of ſovereign princes.

MERIDIAN, in aſtronomy, a great circle of the ſphere paſſing through the zenith, nadir, and poles of the world; dividing the ſphere into two equal parts called hemiſpheres.

MERIDIAN, in geography, a great circle paſſing through the poles of the earth, and any given place on its ſurface; ſo that the celeſtial and terreſtial meridians are both in the ſame plane.

Firſt MERIDIAN, in geography, is that from whence the reſt are reckoned, and where longitude has its beginning. As the fixing a firſt meridian is a matter purely arbitrary, ſeveral perſons, nations, and ages have fixed it differently, which has occaſioned ſome confuſion in geography. The ancients made the firſt meridian paſs through the weſtermoſt place of the world then known; but the moderns, knowing that no place in the earth can be eſteemed the moſt weſterly, have laid aſide the method of computing the longitude of places from one fixed point, and generally aſſume the meridian of the capital city of their country for the firſt meridian.

MERIDIAN *of a Globe* or *Sphere*, is the brazen circle in which the globe revolves. See GLOBE. It is divided into 360 degrees, beginning at the equinoctial; from which on the celeſtial globe is reckoned the ſouth and north declination of the ſun or ſtars, and on the terreſtrial the latitude of places north or ſouth. There are two points on this circle called the poles, and a diameter continued from them through the centre called the axis. There are uſually 36 meridians drawn on a terreſtrial globe; one through every tenth degree of the equator. The uſes of this circle are to ſet the globes to any latitude, to ſhew the ſun's or a ſtar's declination, right aſcenſion, greateſt altitude, &c.

MERIDIAN *Line*, an arch of the meridian of a place terminated each way by the horizon, or it is the interſection of the plane of the meridian of the place with that of the horizon. M. Caſſini has diſtinguiſhed himſelf by a meridian line drawn on the pavement in the church of St. Petronio at Bologna, the largeſt and moſt accurate in the world. In the roof of the church a thouſand inches above the pavement, is a little hole, through which the ſun's image, when in the meridian, falling upon the line, marks his progreſs all the year.

To draw a meridian line. On a ſmooth board deſcribe ſeveral concentrick circles, and erect an iron pin perpendicular in the centre. Set this board horizontally in your garden about nine o'clock; (the beſt time is, when the ſun is near the ſolſtice, ſuppoſe about the 10th of June) ſee where the head of this iron pin, which muſt be ſharp at the top, giveth its ſhadow upon the board, mark that place: then take a wooden ruler, ſharp alſo at one end, and lay it ſo upon the ſharp end of the iron pin, that the ſharp end of the ruler may touch the mark; then, carrying it ſteady, mark the ſegment of a circle towards the north. Come again about three o'clock in the afternoon, and mark where the ſhadow of the top of the iron pin is, in that ſegment again. Then draw a line from thoſe

 two

two marks, which will be eaſt and weſt, and the perpendicular to that line will be a meridian; and, if you halve that line, the perpendicular will go through the centre of the whole circle: for that ſegment is part of the baſis of a cone, whoſe vertex is the top of the iron pin. But becauſe the ſun may be under a cloud, when you come at three o'clock, you may make three or four more ſegments, and uſe them as you uſed this.

This method would be very exact, if the ſun moved as the fixed ſtars do; but becauſe the ſun hath a proper motion, as a planet, there will be ſome inconſiderable error, which yet may be corrected; for ſeeing the ſun in one minute of an hour moveth as much by his daily motion, as he loſeth in ſix hours by his proper motion; you ſhall add as much in the way which the ſhadow goes in the laſt mark, as that ſhadow moveth in one minute, which you may meaſure by your pulſe or pendulum; ſo the laſt point will not be taken juſt in the ſegment, but a little without it.

MERIDIAN *Line*, in dialling, a right line ariſing from the interſection of the meridian of the place with the plane of the dial. See DIAL. This is the line of 12 at noon, and from hence the diviſion of the hour-lines begins.

Magnetical MERIDIAN, that meridian in a loadſtone to which the needle of the mariners compaſs, if not otherwiſe hindered, conforms itſelf.

MERIDIAN *Altitude*, the altitude of the ſun or ſtars when in the meridian of the place where they are obſerved: or an arch of a great circle perpendicular to the horizon, and comprized between the horizon and ſtar then in the meridian of the place. For the method of finding the meridian altitude of the ſun or ſtars, ſee OBSERVATION. To find the meridian altitude of the ſun, &c. by a gnomon. See GNOMON.

MERIDIANI, in antiquity, a kind of gladiators at Rome who entered the arena about noon, after the beſtiarii, who fought againſt beaſts in the morning, went off.

MERIDIONAL *Diſtance*, in navigation, the ſame with departure, being the diſtance meaſured on the parallel of latitude intercepted between the meridian under which the ſhip now is, and any other meridian ſhe was under before.

MERIDIONAL *Parts*, *Miles*, or *Minutes*, in navigation, are the parts by which the meridians in mercator's chart increaſe, as the parallels of latitude decreaſe. See *Mercator's* SAILING.

MERIT, in theology, denotes the moral goodneſs of the actions of men, and the reward due to them.

MERLON, in fortification, is that part of a parapet which is terminated by two embraſſures of a battery. Its height and thickneſs is the ſame with that of the parapet; but its breadth is generally nine feet on the inſide, and ſix on the outſide. It ſerves to cover thoſe on the battery from the enemy; and is better when made of earth well beat and cloſe, than when built with ſtone; becauſe they fly about and wound thoſe they ſhould defend.

MERMAID, or MERMAN, an imaginary animal, ſuppoſed to be half human and half fiſh; which probably took its riſe from an imperfect view of the thrichechus.

MESEMBRYANTHEMUM, fig-marigold, in botany, a genus of plants, whoſe flower is monopetalous and cut into many ſpear-ſhaped linear ſegments, and ranged in ſeveral ſeries: the ſtamina are compoſed of a great number of capillary filaments, terminated by incumbent antheræ: the fruit is a round fleſhy capſule, having ſeveral cells, which are filled with ſmall roundiſh ſeed. There are great varieties of this genus, moſt of which are natives of the Cape of Good-Hope; and are preſerved in our green-houſes, either for the beauty of the flowers of ſome ſpecies, or the agreeable variety of the foliage of others: they are moſt of them perennial plants, and are eaſily raiſed from cuttings in the ſummer months. This genus comprehends the ficoides of Tournefort.

MESENTERY, in anatomy, a thick fat membrane, placed in the midſt of the inteſtines, particularly of the ſmaller ones, whence it has the name. Its ſubſtance is compoſed of membranes, fat veſſels of all kinds, and in the human body of a number of glands. In the upper part, it is connected with the three ſuperior vertebræ of the loins; and in the lower, with the inteſtines and particularly with the jejunum and ileum; to which it alſo gives their outer coat. When it is ſeparated from the inteſtines, it has ſeveral folds reſembling gloves. Its length, in the whole, is about three ells, but the inteſtines which are joined to it, are at leaſt four times that length. Its coats or membranes are two, and between theſe there is a cellular ſubſtance which contains the fat: the meſeraick veſſels and glands are alſo placed there, which many reckon a third coat of the meſentery, and that not improperly; this they call the tunica celluloſa.

The veſſels of the meſentery are blood-veſſels, nerves, lacteals, and lymphaticks. The blood-veſſels are the ſame with thoſe of the inteſtines, and theſe make a multitude of ſtrange meanders, and have very frequent anaſtomoſes. The nerves alſo come from the par vagum, and the intercoſtals.

MESNE, in law, ſignifies him who is lord of a manor, and who hath tenants holding of him, yet himſelf holding of a ſuperior lord. This word alſo ſignifies a writ, which lies where there is a lord-meſne and tenant, and the tenant is diſtrained for ſervices due from the meſne to the ſuperior lord.

MESOCOLON, in anatomy, that part of the meſentery connected with the great guts, eſpecially the colon. The meſocolon meets the midſt of the colon, to which it is joined. Its lower part ſticks to a part of the rectum.

MESOLABE, an inſtrument uſed by the ancients for finding two mean proportionals mechanically, which they could not effect geometrically. It conſiſted of three parallelograms, moving in a groove to certain interſections.

MESOLOGARITHMS, according to Kepler, are the logarithms of the co-ſines and co-tangents, the former of which were called by Lord Napier antilogarithms, and the latter differentials. They are otherwiſe called artificial ſines and tangents. See LOGARITHM, SINE, TANGENTS, &c.

MESPILUS, the medlar, in botany, a genus of plants, whoſe flower conſiſts of five roundiſh concave petals inſerted in the cup; the ſtamina are from 10 to 20 ſubulated filaments, topped with ſingle antheræ. The fruit is a globoſe umbilicated berry, carrying the cup on its top; and contains five oſſeous and gibbous ſeeds. This genus includes the ſeveral ſpecies of hawthorns, the Glaſtonbury thorn, and pyracantha. The fruit of the common medlar is very grateful, though not eatable till it is rotten.

MESSIAH, ſignifies *anointed*. It is applied principally, and by way of eminence, to that ſovereign Deliverer who was expected by the Jews, and whom they vainly expect even to this day, ſince he is already come at the appointed time. They uſed to anoint kings, high-prieſts, and ſometimes prophets. Saul, David, Solomon and Joaſh, received the royal unction: Aaron and his ſons received the ſacerdotal, and Eliſha, the diſciple of Elijah, received the prophetick unction, at leaſt God ordered Elijah to give it, 1 Kings xix. 16. and therefore the name *Meſſiah*, or *Anointed*, is given to the kings, 1 Sam. xii. 3, 5. and alſo to the patriarchs or prophets, 1 Chron. xvi. 22. Pſal. cv. 15. But this name chiefly belongs to *Jeſus Chriſt* by way of excellence, who was the object of the deſire and of the expectation of the ſaints. Hannah, the mother of Samuel, plainly alludes to *Jeſus Chriſt*, when, at the end of her hymn, and at a time when there was no king in Iſrael, ſhe ſays, *The Lord ſhall give ſtrength to his King, and exalt the horn of his Anointed*, 1 Sam. ii. 10. See alſo Pſal. ii. 2. and xlv. 7. Dan. ix. 25, 26.

The unction that the prophets and the apoſtles ſpeak of, when *Jeſus Chriſt* or his apoſtles are underſtood, is the ſpiritual and internal unction of grace and of the Holy Ghoſt, of which the outward and ſenſible unction, with which they anciently anointed kings, prieſts and prophets, was but the figure and ſymbol.

METACARPUS, in anatomy, that part of the hand between the wriſt and the fingers.

METACARPUS, ſignifies alſo a ſmall, very fleſhy muſcles ſituated obliquely between the large internal annular or tranſverſe ligament of the carpus and the whole inſide of the fourth metacarpal bone.

METAGITNION, in chronology, the ſecond month of the Athenian year, containing 29 days, and anſwering to the latter part of our July and beginning of Auguſt.

METAL, *Metallum*, in natural hiſtory, a hard, ſhining, mineral body, fuſible by fire, concreſcible by cold, ductile, and capable of being amalgamated or intimately united to quickſilver. There are properly but ſix metals, gold, ſilver, copper, tin, iron, and lead: to which ſome have added mercury, though it agrees with them in nothing but weight, and being found in the bowels of the earth. Metals are divided into perfect and imperfect; perfect metals are thoſe which undergo all trials by fire, without any ſenſible loſs; ſuch are gold and ſilver, particularly the former: imperfect metals are thoſe which loſe much by being expoſed to the fire, as lead, tin, iron, and copper.

The characteriſtick of metals, is that of all known bodies they are the heavieſt. Dr. Halley found by experiments the weight of gold to be to that of glaſs, as 9 to 1; and the weight of tin, the lighteſt of all metals, to that of gold, as 7 to 19, which conſiderably ſurpaſſes the weight of all marbles, gems, &c. nor is there any body in nature but a metal, that is one third of the weight of gold. The weight of ſeveral metals, &c. having been hydroſtatically examined in air and water by the royal ſociety, they found that, taking the ſame weights of gold and water, the bulk of the former was to the latter, as 19636 to 1000; conſequently gold is to water, nearly as 19 to 1. As to the origin and formation of metals, both ancient and modern philoſophers are of various ſentiments. Des Cartes takes metals to have ranged themſelves from the beginning by the laws of gravity about the centre. M. Tournefort thinks that metals, as well as other minerals, have their origin from ſeeds, like plants. Lidyat endeavours to prove all metals generated by a ſubterranean heat, as many of them, when taken out of the earth, are exceeding hot. Du Hamel ſhews, that metals do not take their riſe either from any vaporous exhalations, or from water or earth, as Plato thought, but are generated of mercury, ſulphur, and ſalt. Dr. Woodward maintains, that all metals, now found in the ſtrata of the earth, owe their preſent condition to the deluge; when he alſo imagines the ſtrata of ſtone, earth, marble, &c. were formed. The ſame ingenious author complains of the great inconſtancy in the mineral and metallick kingdoms, neither the colour, figure, nor ſituation in the earth being to be depended on.

M. Geoffry, from a mixture of ſulphur with a vitriolick ſalt, brought an iron, which he maintained to be a compoſition reſulting from the aſſemblage of certain principles which exiſted ſeparately in the ingredients that formed the metal: and, obſerving that there were parcels of this metal in the coloured aſhes of plants, &c. he concluded that it might be formed there too.

This M. Lemery the younger oppoſed, who maintained that the iron contained in the aſhes of plants was really exiſtent in the plants themſelves, being raiſed in their veſſels along with the juices of the earth: and further that all the ingredients whereof M. Geoffroy's artificial iron was formed, do really contain in themſelves either more or leſs. To this it was anſwered, that, in what manner ſoever iron be procured from the ſeveral ingredients ſeparately, there will ſtill be found infinitely leſs in them than when mixed, and that conſequently the mixture produces iron.

Hence it appears that vegetable matters contain the principles of minerals.

Bath METAL, or *Prince's* METAL, a kind of factitious metal of a beautiful yellow, and diſpoſed to receive a fine poliſh, luſtre, &c. It is prepared, according to Dr. Shaw, as follows: take ſix ounces of copper, melting it in a wind-furnace; add to it one ounce of zink: then ſtirring the whole well together, pour out the metal immediately. The copper and zink may be put into the crucible together, if firſt covered over with the black flux, which prevents the evolution of the zink, or preſerves its metalline form.

Semi-METALS, metallick foſſils, fuſible by fire, and not malleable in their pureſt ſtate. Theſe are all, in their native ſtate, penetrated by, and intimately mixed with ſulphur, and other adventitious matter, and reduced to what are called ores. Of this ſeries of foſſils there are only five bodies, all naturally comprehended in the ſame claſs, but each making a ſeparate and diſtinct genus: theſe are antimony, biſmuth, cobalt, zink, and quickſilver.

METAL, in heraldry. There are two metals uſed in heraldry, by way of colours, viz. gold and ſilver, in blazon called or and argent.

METALLURGY, the art of preparing or working metals, from the mineral or ore in the mine.

METAMORPHOSIS, the change of any thing into another form.

METAPHOR, in rhetorick, a trope, by which we put a ſtrange word for a proper word, by reaſon of its reſemblance to it: or it may be defined, a ſimile or compariſon intended to enforce and illuſtrate the thing we ſpeak of, without the ſigns or forms of compariſon. Thus, if we ſay, God is a ſhield to good men, it is a metaphor, becauſe the ſign of compariſon is not expreſſed, though the reſemblance, which is the foundation of the trope, is plain; for as a ſhield guards him that bears it, againſt the attacks of an enemy, ſo the providence and favour of God protects good men from malice and misfortunes: but if the ſentence be put thus, God is as a ſhield to good men, then it becomes a ſimile or compariſon.

A metaphor may be formed from any thing that is the object of any of our ſenſes; but that is generally the moſt agreeable and ſprightly, which ariſes from the ſenſe of ſeeing; becauſe of all the ſenſes, ſeeing is the moſt perfect and comprehenſive, the moſt unwearied and inquiſitive, the moſt deſirable and delightful. Mr. Du Boſs juſtly obſerves, that metaphors, and all the other figures of rhetorick, ought to be adapted to the circumſtances and ſituation of thoſe for whoſe uſe they are deſigned.

METAPHRASE, uſually ſignifies ſomething more than either a tranſlation or a paraphraſe; according to Baillet, a metaphraſt implies a tranſlator, gloſſator, and interpolator altogether.

METAPHYSICKS, *Metaphyſica tranſnaturalis*, ontology, or ontoſophy, a ſcience that treats of being, as ſuch, in the abſtract. All other ſciences have a neceſſary dependance on this, for it ſupplies them with a foundation and a method to proceed upon, without which, our knowledge of any ſubject muſt be very confuſed and imperfect. This was probably the reaſon that made Ariſtotle ſtyle this ſcience the true beginning of philoſophy, and the moſt noble of all ſciences. As it is wholly converſant in the acts of the underſtanding, it raiſes itſelf above the verge of ſenſe and matter, by its abſtracted views. The quantity of bodies it refers to the conſideration of geometry, and their ſenſible qualities to natural philoſophy, applying itſelf only to beings ſeparated from their individual ſingularity, ſuch as ſubſtances, accidents, relations, and whatever elſe may be conceived abſtractly from matter; but particularly beings purely ſpiritual, ſuch as God, angels, and the ſoul of man: hence Ariſtotle terms it natural theology. The end of this ſcience is the ſearch of pure and abſtracted truth.

It caſts a light upon all the objects of thought and meditation, by ranging every being with all the abſolute and relative perfections and properties, modes and attendants of it, in proper ranks or claſſes; and thereby it diſcovers the various relations of things to each other, and what are their general or ſpecial differences from each other; wherein a great part of human knowledge conſiſts: and, by this means, it greatly conduces to inſtruct us in method, or the diſpoſition of putting every thing into its proper rank and claſs of being, attributes or actions; and hence its proper affinity with logick. See METHOD.

This ſcience, however it may ſeem to have been laboured, is yet capable of being further improved; but it has many obſtacles in its way. If we are ſhort ſighted in phyſical matters, which are nearer our ſenſe, and in a manner within our view, how much more muſt we be bewildered in our ſearch after ſpiritual abſtracted truths, in the conſideration of univerſals, and of things of a tranſcendant nature, ſuch as fall properly under the conſideration of metaphyſicks. This ſcience proceeds in unfrequented and almoſt unknown paths, containing very few doctrines of allowed and eſtabliſhed certainty; few principles in which men are univerſally agreed; ſcarce any juſt definition, any exact and complete diviſion: and conſequently affords large matter for doubts and diſputes. For, though metaphyſical truths may be certain enough in their own nature, yet they are not uſually ſo to us; but being abſtruſe things, and lying deep and

remote from ſenſe, it is not every one that is capable of comprehending them.

METAPLASMUS, in grammar, a tranſmutation, as the changing the word by adding, retrenching, or altering ſome letter or ſyllable of it.

METASTASIS, in medicine, a tranſpoſition of ſome humour or diſeaſe from one part of the body to another.

METATARSUS, in anatomy, a fleſhy maſs lying under the ſole of the foot.

METATHESIS, in grammar, a ſpecies of the metaplaſmus; being a figure whereby the letters or ſyllables of a word are tranſpoſed, or ſhifted out of their uſual ſituation, as piſtris for priſtis, lybia for libya, &c.

METEMPSYCHOSIS, the doctrine of tranſmigration, which ſuppoſes that human ſouls, upon their leaving the body, become the ſouls of ſuch kind of brutes as they moſt reſemble in their manners.

METEMPTOSIS, a term in chronology, expreſſing the ſolar equation, neceſſary to prevent the new moon from happening a day too late, by which it is oppoſed to proemptoſis, which ſignifies the lunar equation neceſſary to prevent the new moon from happening a day too ſoon.

METEOR, in phyſiology, an imperfect, changeable, and mixt body, or the reſemblance of a body appearing in the atmoſphere, and formed by the action of the heavenly bodies, out of the common elements.

METHOD, in logick, &c. the arrangement of our ideas in ſuch a regular order, that their mutual connection and dependance may be readily comprehended. See IDEA and KNOWLEDGE.

METHODISTS, *Methodici*, a ſect of ancient phyſicians, who reduced the whole healing art to a few common principles or appearances.

The Methodiſts were the followers of Theſſalus, whence they were called Theſſalici. They were ſtrenuouſly oppoſed by Galen in ſeveral of his writings; who ſcrupled not to aſſert, that the methodical hereſy ruined every thing that was good in the art.

Quincy miſtakenly uſes *Methodiſts*, *methodici*, for thoſe phyſicians who adhere to the doctrine of Galen, and the ſchools; and who cure with bleedings, purges, &c. duly applied according to ſymptoms, circumſtances, &c. in oppoſition to empiricks and chymiſts, who uſe violent medicines, and pretended ſecrets or noſtrums.

METHODISTS, is alſo a name given, ſome years ago, to a ſociety of religious men at Oxford, on account of certain rules of conduct obſerved by them in reſpect to religious and civil duties, and afterwards applied to others who followed them. Theſe ſoon diſſented from each other upon ſome eſſential points of doctrine; one party, adhering ſtrictly to the articles of the church of England, under the late Mr. Whitefield, Mr. Hervey, &c. and the other, cleaving to the Arminian tenets, under the direction of Meſſ. John and Charles Weſley. Theſe laſt, from ſome peculiarities and rules in their ſociety, are now properly known by the name of *Methodiſts*, and ſeem indeed, both in principles and practice, very far departed from the doctrines and canons of the eſtabliſhed church. Some of this ſect, a few years ſince, made a great noiſe upon the ſubject of *perfection*, which they held as certainly attainable in this life, and under that notion fell into ſo many extravagancies, that their opinion has been juſtly exploded.—The title has been ſometimes given, though very unfairly, to perſons of the eſtabliſhed communion, who, by ſtricter ſanctity of life, or more rigid adherence to the 39 articles and homilies, have been diſtinguiſhed from the world.

METOCHE, in ancient architecture, a term uſed by Vitruvius to ſignify the ſpace or interval between the denticles.

METONICK CYCLE, in chronology, the ſame with the cycle of the moon. SEE CYCLE.

METONYMY, in rhetorick, is a trope in which one name is put for another, on account of the near relation there is between them.

METOPE, *Metopa*, in architecture, is the interval or ſquare ſpace between the triglyphs of the Dorick frieze, which, among the ancients, uſed to be painted or adorned with carved work, repreſenting the heads of oxen, or utenſils uſed in ſacrifices.

Semi-METOPE, in architecture, is a ſpace in the corner of the Dorick frieze, ſomewhat leſs than half a metope.

METOPOSCOPY, the pretended art of knowing a perſon's diſpoſitions and manners, by viewing the traces and lines in the face. See PHYSIOGNOMICKS.

METRE, μετρια, in poetry, a ſyſtem of feet of a juſt length. See NUMBERS.

METRETES, an ancient meaſure of capacity, containing a little more than nine gallons.

METRICAL, ſomething relating to metre.

METROPOLIS, the capital or principal city of a county or province.

MEW, a place where a hawk is ſet, during the time ſhe raiſes her feathers.

MEWING, the falling off, or change of hair, feathers, ſkin, horns, or other parts of animals, which in ſome happens annually, in others only at certain ſtages of their lives: but the generality of beaſts mew in the ſpring.

MEZEREON, in botany, a ſhrub common in our gardens; the flowers come out very early in the ſpring, before the leaves appear, growing in cluſters all round the ſhoots of the former year. There are two ſorts of mezereon, one producing white flowers with yellow berries, and the other having pink coloured flowers with red berries.

MEZZOTINTO, a particular manner of repreſenting figures on copper, ſo as to form prints in imitation of painting in Indian ink. The manner of making mezzotintos is very different from all other kinds of engraving and etching, ſince inſtead of forming the figures with lines and ſcratches, made with the point of a graver, or by means of aqua fortis, they are wholly formed by ſcraping and burniſhing.

Mezzotintos are made in the following manner: Take a well-poliſhed copper-plate, and beginning at the corner, rake or furrow the ſurface all over with a knife or inſtrument made for the purpoſe, firſt one way and then the other, till the whole is of a regular roughneſs, without the leaſt ſmooth part to be ſeen; in which ſtate, if a paper was to be worked off from it at the copper-plate preſs, it would be all over black. When this is done, the plate is rubbed over with charcoal, black-chalk, or black-lead, and then the deſign is drawn with white chalk; after which, the outlines are traced out, and the plate finiſhed by ſcraping off the roughneſs, ſo as to leave the figure on the plate. The out-lines and deepeſt ſhades are not ſcraped at all, the next ſhades are ſcraped but little, the next more, and ſo on, till the ſhades gradually falling off, leave the paper white, in which places the plate is neatly burniſhed. By an artful diſpoſition of the ſhades, and different parts of a figure on different plates, mezzotintos have been printed in colours, ſo as nearly to repreſent very beautiful paintings.

MIASMA, among phyſicians, denotes the contagious effluvia of peſtilential diſeaſes, whereby they are communicated to people at a diſtance.

MICAH, or *the Book of* MICAH, a canonical book of the Old-Teſtament, written by the prophet Micah, who is the ſeventh of the twelve leſs prophets. He is cited by Jeremiah, and propheſied in the days of Jotham, Ahaz, and Hezekiah. He cenſures the reigning vices of Jeruſalem and Samaria, and denounces the judgements of God againſt both kingdoms. He likewiſe foretels the confuſion of the enemies of the Jews, the coming of the Meſſiah, and the glorious ſucceſs of his church.

MICHAELMAS, or *the Feaſt of St.* MICHAEL *and all Angels*, a feſtival of the Chriſtian church, obſerved on the twenty-ninth of September.

MICHELIA, in botany, a genus of plants, whoſe flower conſiſts of eighteen lanceolated petals, with many, very ſhort, ſubulated filaments, topped with erect pointed antheræ: the fruit is compoſed of a number of globoſe unilocular berries, each containing four ſeeds, convex on one ſide and angulated on the other.

MICROCOSM, a Greek term, ſignifying the little world; uſed by ſome for a man, as being ſuppoſed an epitome of the univerſe, or great world.

MICROGRAPHY, the deſcription of objects, too minute to be viewed without the aſſiſtance of a microſcope. See MICROSCOPE.

MICROMETER, an aſtronomical machine, which, by means of a ſcrew, ſerves to meaſure extremely ſmall diſtances in the heavens, &c. and that to a great degree of accuracy.

The micrometer conſiſts of a graduated circle, (*Plate* LVI. *fig.* 2.) of a ſcrew *qo*, and its index *qr*. The threads

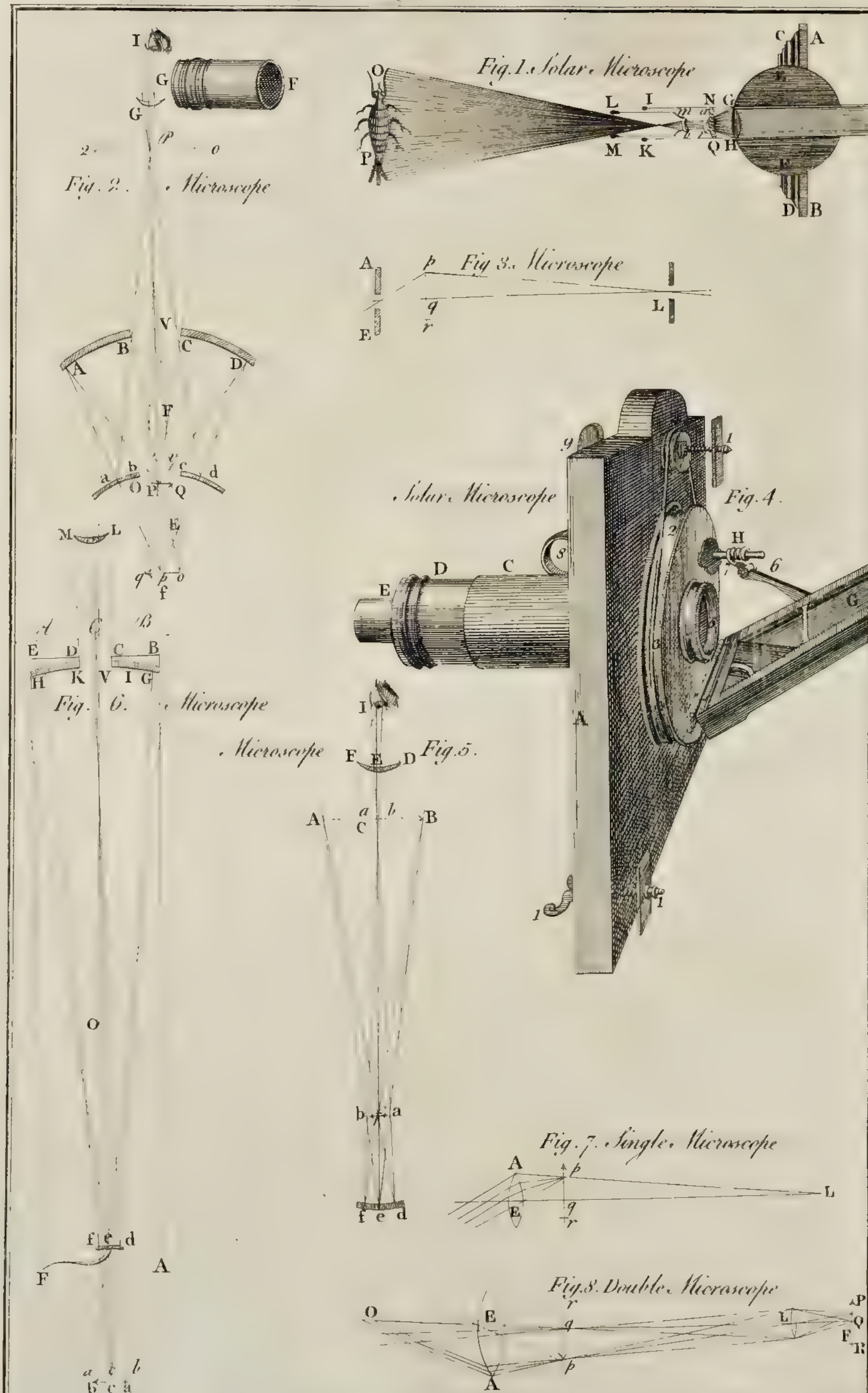
Fig. 1. Solar Microscope
Fig. 2. Microscope
Fig. 3. Microscope
Solar Microscope
Fig. 4.
Fig. 6. Microscope
Microscope
Fig. 5.
Fig. 7. Single Microscope
Fig. 8. Double Microscope

threads of the ſcrew are ſuch that 50 make the length of one inch exactly. When it is to be uſed, the point *o* is ſet to the ſide of the part to be meaſured, and then the index is turned about with the finger, till the eye perceives the point has juſt paſſed over the diameter of the part; then the number of turns, and parts of a turn, ſhewn by the graduated circle, will give the dimenſions in part of an inch, as we ſhall ſhew by the following example: Suppoſe it required to meaſure the diameter of an human hair, and we obſerve the index is turned juſt once round, while the point *o* paſſes over it. Then it is plain, the diameter of the hair in the image is $\frac{1}{50}$ of an inch. Now if the microſcope IDEF *def*, magnifies 6 times, or makes the image 6 times larger in diameter than the object, then is the diameter of the hair itſelf but $\frac{1}{6}$ of $\frac{1}{50}$, that is but $\frac{1}{300}$ part of an inch.

Alſo, it is to be obſerved, that as there are ten large diviſions and 20 ſmall ones, on the micrometer-plate, ſo each of thoſe ſmall diviſions are the $\frac{1}{20}$ of $\frac{1}{50}$, or the $\frac{1}{1000}$ part of an inch. Therefore, if, in meaſuring any part of an object, you obſerve how many of theſe ſmaller diviſions are paſſed over by the index, you will have ſo many thouſand parts of an inch for the meaſure required. All which is ſo plain, that nothing can be ſaid to illuſtrate the matter.

MICROSCOPE, an optical inſtrument, by means whereof very minute objects are repreſented, exceedingly enlarged, and are viewed very diſtinctly according to the laws of refraction or reflection.

Microſcopes are either ſingle or double; a ſingle microſcope is only a very ſmall globule of glaſs, or a ſmall double convex glaſs, whoſe focal diſtance is very ſhort. A minute object *pq* (*Plate* LVII. *fig.* 7.) ſeen diſtinctly through a ſmall glaſs AE by the eye put cloſe to it, appears ſo much greater than it would to the naked eye, placed at the leaſt diſtance *q*L from whence it appears ſufficiently diſtinct, as this latter diſtance *q*L is greater than the former *q*E. For having put your eye cloſe to the glaſs EA, in order to ſee as much of the object as poſſible at one view, remove the object *pq* to and fro till it appears moſt diſtinctly, ſuppoſe at the diſtance E*q*. Then conceiving the glaſs AE to be removed, and a thin plate, with a pin-hole in it, to be put in its place (*fig.* 3.) the object will appear diſtinct, and as large as before, when ſeen through the glaſs, only not ſo bright. And in this latter caſe, it appears ſo much greater than it does to the naked eye, at the diſtance *q*L, either with the pin-hole or without it, as the angle *p*E*q* is greater than the angle *p*L*q*, or as the latter diſtance *q*L is greater than the former *q*E. Since the interpoſition of the glaſs has no other effect than to render the appearance diſtinct, by helping the eye to increaſe the refraction of the rays in each pencil, it is plain that the greater apparent magnitude is entirely owing to a nearer view than could be taken by the naked eye. If the eye be ſo perfect as to ſee diſtinctly by pencils of parallel rays falling upon it; the diſtance, E*q*, of the object from the glaſs, is then the focal diſtance of the glaſs. Now if the glaſs be a ſmall round globule whoſe diameter is $\frac{1}{15}$ of an inch, its focal diſtance E*q* being three quarters of its diameter, is $\frac{1}{20}$ of an inch; and if *q*L be eight inches, the uſual diſtance at which we view minute objects, this globule will magnify at the rate of 8 to $\frac{1}{20}$, or of 160 to 1.

In microſcopes made with ſingle lenſes, a given object placed at their principal focus's will appear equally diſtinct, if their linear apertures be as their focal diſtances. And in microſcopical lenſes, whoſe focal diſtances are not much longer than half an inch, there is no need to contract their apertures, for procuring diſtinct viſion; the pupil itſelf being ſmall enough to exclude the exterior ſtraggling rays. But in ſmaller lenſes, where apertures are neceſſary to preſerve the ſame degree of diſtinctneſs, their diameters muſt be as their focal diſtances; and then the apparent brightneſs will decreaſe in a duplicate ratio of their focal diſtances, ſo that by uſing ſmaller glaſſes the apparent magnitude and the obſcurity of the object will both increaſe in the ſame ratio.

A double microſcope is compoſed of two convex glaſſes placed at E and L. (*fig.* 8.) The glaſs L next the object PQ is very ſmall and very convex, and conſequently its focal diſtance LF is very ſhort; the diſtance LQ of the ſmall object PQ, is but a little greater than LF; ſo that the image *pq*, may be formed at a great diſtance from the glaſs, and conſequently may be much greater than the object itſelf. This picture *pq*, being viewed through a convex eye-glaſs AE, whoſe focal diſtance is *q*E, appears diſtinct. Now the object appears magnified upon two accounts; firſt, becauſe if we viewed its picture *pq* with the naked eye, it would appear as much greater than the object, at the ſame diſtance, as it really is greater, or as much as L*q* is greater than LQ; and ſecondly, becauſe this picture appears magnified through the eye-glaſs as much as the leaſt diſtance at which it can be ſeen diſtinctly with the naked eye, is greater than *q*E, the focal diſtance of the eye-glaſs. For example, if this latter ratio be 5 to 1, and the former ratio of L*q* to LQ be 20 to 1, then upon both accounts the object will appear 5 times 20, or 100 times greater than to the naked eye.

To fit theſe microſcopes to ſhort-ſighted eyes, the glaſſes E and L muſt be placed a little nearer together; ſo that the rays of each pencil may not emerge parallel, but may fall diverging upon the eye; and then the apparent magnitude will be altered a little, but ſcarce ſenſibly.

Catadioptrick MICROSCOPE, is that which performs its effects by reflection and refraction jointly; for it is conſtructed with a ſmall ſpeculum *fcd* (*plate* LVII. (*fig.* 5.) whoſe focus is at *f*; and it is plain that, if a ſmall object *ab* be placed a little further from the ſpeculum than the focus *f*, there will be formed a large image thereof, AB; which image will be inverted, and in proportion to the object as the diſtance C*e* to the diſtance *fe*, as when an object-lens was uſed.

Part of this image is viewed by an eye-glaſs FD, which is, or ought to be a meniſcus, as here repreſented; becauſe, the image being formed by reflection, it will be more perfect, and admit of a deeper charge in the eye-glaſs DF; and thoſe of the meniſcus form are beſt for this purpoſe, becauſe the errors of the rays, and, conſequently, the confuſion cauſed thereby, in the refraction made at the convex ſurface, are in a greater meaſure rectified by the contrary refraction at the concave ſurface, as is eaſy to underſtand from the nature of refracted light.

Another ſort of catoptrick or reflecting microſcope is conſtructed with two ſpeculums, *abcd* and ABCD, (*fig.* 2.) with a central hole in each. The large ſpeculum is concave, the other convex, and both of equal ſphericity. They have their focus at one inch diſtance, and placed at the diſtance of $1\frac{1}{2}$ inch from each other, that ſo an object OPQ, being placed a little before the ſmall ſpeculum, might be nearer to the large one than its centre E.

This being the caſe, the rays PA, PD, which flow from the point P to the ſpeculum AD, will be reflected towards a focus *p*, where an image *opq* would be formed, if the rays were not intercepted by the convex ſpeculum *ab*; and, the point *p* being nearer than its focus *f*, the rays A*a*, D*d*, which tend towards it, will be reflected to a focus P, where the laſt image OPQ will be formed, to be viewed by the eye-glaſs G, tranſmitting parallel rays to the eye at I.

But a better form and eaſier method of conſtructing a catoptrick microſcope, with two reflecting mirrours, is that which follows. ABCDEF (*fig.* 6.) is a caſe or tube, in one end of which is placed a concave ſpeculum GH, with a hole IK in the middle; the centre of this ſpeculum is at *c*, and its focus at O, ſo that VO=O*c*. At the open end of the tube is placed a ſmall convex ſpeculum *def*, on a foot *e*F, by which it is moveable nearer to or further from the larger ſpeculum GH, as occaſion requires.

If now the object *ab* be poſited in the centre *c* of the large ſpeculum, the image thereof *ab* will be formed in the place; and this conſideration is all the reaſon of this form of a microſcope; for if now we look upon the image *ab*, as an object nearer to the convex ſpeculum *df* than its focus *f*, it is plain a larger image AB will be formed thereby at the focus *C*, or that the rays *c*G, *c*H, proceeding from any point *c* in the object *ab*, will be reflected back upon themſelves, as being perpendicular to the ſpeculum; but the refracted rays meeting with, or impinging on, the convex ſurface of the ſpeculum *df*, will, as they tend to a point *c*, nearer than the focus *f*, be reflected to a focus *C*.

Solar MICROSCOPE, is a moſt curious improvement in opticks, and deſerves to be greatly valued, as it is the beſt method which nature will admit of, or art can furniſh,

nish, for magnifying and exhibiting very small transparent objects to the view of spectators.

This instrument consists of several parts, viz. A, (*plate* LVII. *fig*. 4.) a square frame of mahogany to be fixed to the shutter of a window, by means of the screws 1, 1. To this frame is applied a circular collar of the same wood, with a groove on its periphery on the outside, denoted by 2, 3. This collar is connected by a cat-gut to the pulley 4 on the upper part, which is turned round by the pin 9 within. On one part of the collar, on the outside, is fastened, by hinges, a looking glass G, in a proper frame, to which is fixed the jointed wire, 6, 7, by which means, and the screw H 8, it may be made to stand in an angle more or less inclined to the frame. In the middle of the collar is fixed a tube of brass C, near two inches in diameter; the end of which, on the outside, has a convex lens 5, to collect the sun-beams thrown on it by the glass G, and converging them towards a focus in the other part, where D is a tube sliding in and out to adjust the object to a due distance from the focus.

This instrument has been contrived very commodiously in several different forms; but we shall here illustrate the above by a diagram. A B (*fig*. 1.) is a section of the window-shutter of a dark room, C D of the frame containing a scioptrick ball E F; in the forepart whereof is screwed the tube G I K H, at the one end of which is a lens G H, which, by converging the sun-beams into a narrow compass, does strongly enlighten the small object *a b*, placed on a slip of glass, or otherwise, in the part of the tube N Q, where a slit is made on each side for that purpose. Within this tube there slides another L *m r* M, which contains a small magnifying lens *m r*. By moving the exterior tube I G H K one way and the other, the glass G H will be brought to receive the rays of the sun directly, and will therefore most intensely illuminate the object *a b*. The other tube L M, being slid backwards and forwards, will adjust the distance of the small lens *m r*, so that the image of the object *a b* shall be made very distinct, on the opposite side of the room at O P; and the magnitude of the image will be to that of the object, as the distance from the lens *m r* is to the distance of the object from it, as is evident from the figure.

If the linear dimensions of the image be nicely taken by an assistant, with a graduated scale of equal parts, the dimensions of the object will be known of course from the distances of the image and object from the lens; and in exceeding small objects, such as the pores of cork, the particles of blood, animalcula in semine, &c. there is no other way of measuring them so well: and thus the solar microscope becomes a micrometer in the last degree of possible mensuration.

The great artifice and conveniency of this solar microscope is, that by means of the glass G the oblique rays of the sun are made to go straight along the dark room parallel to the floor, instead of falling upon it. By the pulley 4, 5, the glass is turned directly to the sun, and by the jointed wire and screw at H it is elevated or depressed, so as to bring the glass into the position required. Mr. Liberklum, a Prussian gentleman, was the first who invented this method of magnifying objects, but without the looking-glass, which was afterwards added to it. The theory of this contrivance and the magick lanthorn is the same; only here we make use of sun-beams instead of candle-light, and the object and magnifying lens of the smallest size.

MID HEAVEN, *Medium Cœli*, in astronomy, that point of the ecliptick which culminates or is in the meridian.

MIDDLE LATITUDE, in navigation, is half the sum of two given latitudes.

MIDDLE *Latitude Sailing*, denotes a method of working the several cases in sailing, nearly agreeing with Mercator's way, but without the help of meridional parts. See *Middle Latitude* SAILING.

MIDRIFF, in anatomy. See DIAPHRAGM.

MIDSHIPMEN, officers on board a ship, whose station, when on duty, is, some on the quarter deck, others on the poop, &c. They are to mind the braces, pass the word of command from the captain and other superior officers. They all assist on occasion in navigating the ship, stowing, rumaging, &c. They are usually gentlemen, who, having served their time as volunteers, are upon their preferment.

MIDSUMMER DAY, the festival of St. John the Baptist, being the 24th of June.

MIGRATION, or TRANSMIGRATION, denotes the removal of any thing out of one place into another, particularly of colonies of people, birds, &c. into other countries.

As to the migration of the souls of men into other animals, see METEMPSYCHOSIS.

The swallow, quail, stork, crane, fieldfare, woodcock, nightingale, &c. are birds of passage, or migration. Mr. Derham observes two things remarkable in these creatures: 1. That such untaught, unthinking birds should know the proper times when to come, and when to go; as also, that some should come when others go: and, 2. That they should know what way to steer their course, and whither to go. Lud. de Beaufort remarks, that birds in their migration observe a wonderful order; they fly in troops over huge unknown regions without a compass, and they are peculiarly formed for long flights by the structure of their parts. Mr. Willoughby thinks the swallows fly into Egypt and Ethiopia. Olaus Magnus says they lurk in holes or under water.

MILDEW, *Rubigo*, a kind of disease in plants that arises from a dewy moisture, which falling on them, and continuing, by its acrimony corrodes the inmost substance of the plant, and hinders the circulation of the nutritive sap: whereby the leaves fade, and the blossoms and fruit are much prejudiced.

MILE, in geography, a long measure, whereby the English, &c. use to express the distance between places. It is of different extent in different countries. The geometrical or Italian mile contains 1000 geometrical paces, mille passus, from whence mile is denominated.

The English mile consists of 1760 yards, and is divided into eight furlongs, and each furlong into 40 poles, consisting of 16 feet and a half each.

MILIARY, something resembling millet-seed.

MILIARY-FEVER, a malignant fever, so called from the eruption of certain pustules resembling millet-seeds.

It begins with a slight shivering, succeeded by heat and loss of strength, sometimes even to faintness; there is a straitness and anxiety about the breast, attended with deep sighs, restlessness, and disturbed sleep; and to these succeed a roughness of the skin like that of a goose, and a great number of pustules appear, sometimes white and sometimes red, or both together, of the size of millet or mustard-seed. They first beset the neck, then the breast and back, and afterwards the arms and hands: and when these appear, the other symptoms gradually go off; the pustules ripening, and containing a stinking ichor. These pustules appear on the third, fourth, seventh, or sometimes not till the 14th day.

The principal intention of cure, is to expel and keep out the morbifick matter which forms the pustules; for it is often fatal when the pustules disappear, and cannot be driven out again. Bleeding should be cautiously used; and the patient should not rise out of bed, or continue long in an erect posture, for fear of fainting, or striking the pustules in: analeptick medicines are necessary to keep up the spirits; and to these may be added, according to circumstances, gentle diaphoreticks. Some greatly commend diaphoretick antimony, for promoting the discharge of the pustules, and to take off a delirium; the dose being a scruple every sixth hour. Hoffman recommends blisters, applied to the legs, for the same purpose.

Hamilton's method of cure is to give the testaceous powders, which keep up a moderate warmth, absorb the acidity of the blood, and promote a breathing sweat: take of powder of crabs claws and sperma-ceti, each one scruple; of saffron, five grains; and of the pectoral sirup as much as is sufficient to make into a bolus, to be taken every sixth hour. Blisters are also necessary through the whole course.

MILITANT, or CHURCH-MILITANT, denotes the body of Christians while here on earth. See CHURCH.

MILITARY, something belonging to the soldiery or militia.

MILITARY *Architecture*, the same with fortification. See FORTIFICATION.

MILITARY *Ways*, *Viæ militares*, the large Roman roads which Agrippa procured to be made through the empire in Augustus's time, for the marching of troops and conveying of carriages. These were paved from the

gates of Rome, to the utmoſt limits of the empire. See ROAD.

MILITIA, in general, denotes the body of ſoldiers, or thoſe who make profeſſion of arms. In a more reſtrained ſenſe, militia denotes the trained bands of a town or country, who arm themſelves, upon a ſhort warning for their own defence. So that, in this ſenſe, militia is oppoſed to regular or ſtated troops. For the direction and command of the militia, the king conſtitutes lords-lieutenants of each county.

MILK, *Lac*, a well known animal fluid, prepared by nature in the breaſts of women, and the udders of other animals, for the nouriſhment of their young.

MILK *of Sulphur*. See SULPHUR.

MILL, properly denotes a machine for grinding; but more generally it denotes all ſuch machines whoſe action depends upon a circular motion. The various kinds may be reduced to wind-mills, water-mills, and hand-mills; under the laſt of which are compriſed thoſe worked by horſes, &c.

Water-MILLS, are thoſe turned by the force or fall of a river, of which there are two kinds; thoſe where the force of the water is applied above the wheel are called over-ſhot, and thoſe where it is applied below the wheel, are called under-ſhot. See WATER-MILL.

Wind-MILLS, are thoſe which are turned by the force of the wind. See WIND-MILL.

Hand-MILLS, are thoſe kept in motion by the hand, or by the force of horſes or other beaſts.

MILL, alſo denotes any machine, which, when moved by ſome external force, makes a violent impreſſion on things applied thereto.

Fulling-MILLS, are machines moved by water which raiſe and let fall large wooden piſtons in peels or troughs, in order to full and ſcour woollen ſtuffs.

Paper-MILL. See PAPER.

MILL, in coinage, is a machine uſed to prepare the laminæ or plates of metal, and to give them the proper thickneſs, hardneſs, and conſiſtence, before they be ſtruck or ſtamped. See COINING.

Forge-MILLS, are machines turned by water, which raiſe and let fall one or more huge hammers, to beat and form the iron into bars, anchors, and other maſſive works.

Gunpowder-MILL, is that uſed to pound and beat together the ingredients whereof gunpowder is compoſed.

Sawing-MILL, is a machine turned by the water, which ſaws ſeveral planks or boards at the ſame time. Theſe are common in France, eſpecially in Dauphiné. They were lately prohibited in England, where they were begun to be introduced; becauſe it was apprehended they would have ruined the ſawyers, which would certainly have been the conſequence.

Sugar-MILL, a machine which ſerves to bruiſe the ſugar-canes, and expreſs the liquor or juice contained in them. See SUGAR-MILL.

MILLENARIANS, or CHILIASTS, a name given to thoſe, who, in the primitive ages, believed that the ſaints will one day reign on earth with Jeſus Chriſt a thouſand years. The former appellation is of Latin original, the latter of Greek, and both of the ſame import.

The millenarians held, that after the coming of antichriſt, and the deſtruction of all nations, which ſhall follow, there ſhall be a firſt reſurrection of the juſt alone: that all who ſhall be found upon earth, both good and bad, ſhall continue alive; the good, to obey the juſt who are riſen, as their princes; the bad, to be conquered by the juſt, and to be ſubject to them: that Jeſus Chriſt will then deſcend from heaven in his glory: that the city of Jeruſalem will be rebuilt, enlarged, embelliſhed, and its gates ſtand open night and day. They applied to this new Jeruſalem, what is ſaid in the Apocalypſe, ch. xxi. and to the temple, all that is written in Ezekiel xxxvi. Here, they ſuppoſed, Jeſus Chriſt will fix the ſeat of his empire, and reign a thouſand years with the ſaints, patriarchs and prophets, who will enjoy perfect and uninterrupted felicity.

This reign of our Saviour on earth is uſually ſtiled the millenium, or reign of a thouſand years.

MILLEPEDES, wood lice, ſows, or church bugs, in natural hiſtory, are ſmall inſects of an oblong figure, and of a dark bluiſh livid grey colour; but they can occaſionally roll themſelves up into the form of a ball, which they frequently do, and ſuffer themſelves to be taken, when they might have eſcaped by running.

Millepedes are aperient, attenuant, and detergent; they diſſolve viſcous humours, and are good in all obſtructions of the viſcera, and have been by ſome writers celebrated as a remedy for the ſtone, which it is pretended they have a power of reducing to a mucilage, and carrying off; but this is of the number of thoſe praiſes of medicines which redound very little to the praiſe of thoſe who gave them. They are often found to be of ſervice in aſthmas, and great good has been done by a long courſe of them in diſorders of the eyes.

MILLENNIUM, literally denotes a thouſand years, and is chiefly applied to the time of our Saviour's ſecond appearance and reign upon earth, according to ſome divines. Whiſton ſupports this opinion in ſeveral of his writings; and according to his computation, it was to have commenced in 1720.

MILLERIA, a genus of the ſyngeneſia polygamia neceſſaria claſs. It has neither receptacle nor pappus; the calix conſiſts of three valves; and the radius of the corolla is dimidiated. There are two ſpecies, both natives of America.

MILLET, *Millium*, in botany, a genus of plants, of the gramineous kind, the flower cup of which is a bivalvular glume, the corolla is leſs than the cup, and is alſo bivalvular; it has three very ſhort capillary filaments terminated by oblong antheræ: the ſeeds are roundiſh and covered by the corolla. The ſeeds of millet are much uſed as a common aliment in the eaſtern countries, where they boil it in milk, it having the ſame virtues as rice: they are accounted drying, and recommended in fluxes: they are alſo ſaid to promote ſweat and urine very powerfully.

MILLING, in the manufacture of cloth, the ſame with fulling. See FULLING.

MILLING *of Silk*, is an operation otherwiſe called throwing.

MILLION, in arithmetick, the number of ten hundred thouſand, or a thouſand times a thouſand.

MILVUS, the kite, in ornithology, a ſpecies of falcon, with a forked tail, a yellow cera, a brown body, and a whitiſh head. It is a very common bird with us, about the ſize of a large tame pigeon.

MIME, in the ancient comedy, a perſon who acted any character by mere geſtures, and hence denominated pantomine.

MIMESIS, in rhetorick, the imitating the voice and geſtures of another perſon.

MIMOSA, the ſenſitive plant, in botany, a genus, whoſe flower has a ſingle ſmall infundibuliform corolla, lightly cut at the extremity into five parts; the ſtamina are a number of long hairy filaments, terminated with incumbent antheræ; the fruit is a long articulated pod, containing ſeveral compreſſed roundiſh ſeeds.

To this genus Linnæus has added the acacia of Tournefort, and the inga of Plumier. There are ſeveral ſpecies of the mimoſa, but the ſenſitive plant, or humble plant (ſo denominated from its remarkable property of receding from the touch, and giving ſigns as it were of animal life and ſenſation, which has hitherto not been accounted for) performs its motions by means of two diſtinct articulations; that is, either by touching the leaves lightly when they contract themſelves together, and if the motion wherewith the plant is moved be ſtrong, then the leaves not only contract but the footſtalk which ſupports them alſo declines from that part of it which connects with the branch, as though it were faſtened to it by a kind of hinge: when the leaves are thus ſtruck, the whole plant appears as though it were withered, like others which happen to be tranſplanted in very hot weather; but it may be remarked, that theſe plants are more ſuſceptible of the touch in very warm weather than when it is cool, and in about 10 minutes or a quarter of an hour the leaves expand again.

The ſenſitive plant being a native of the W. Indies, it therefore requires a hot-houſe in this climate: they are commonly propagated from ſeeds, which ſhould be ſown in the ſpring upon a hot bed; in about three weeks after the plants are come up they ſhould be tranſplanted ſingly into ſmall pots, and plunged into a freſh hot-bed, and afterward when ſummer is come on may be removed into a hot-houſe; or where that conveniency is wanting, they

they may be kept under a common glaſs light, it being neceſſary to protect them from the open air, not only on account of their tenderneſs, but alſo to keep their leaves expanded; in the hot-houſe they may be kept the winter, and the following ſummer they will flower and perfect their ſeeds.

MIND, *Mens*, a thinking intelligent being, otherwiſe called ſpirit, in oppoſition to matter or body. See BODY and SPIRIT.

The culture of the human mind is more immediately taught in the ſciences of logick and ethicks. See LOGICK and ETHICKS.

When the mind, ſays Mr. Locke, turns its view inwards upon itſelf, thinking is the firſt idea that occurs; wherein it obſerves a great variety of modifications, whence it frames to itſelf diſtinct ideas. See IDEA.

MINE, in military affairs, implies a ſubterraneous paſſage dug under the wall, or rampart of a fortification, with a deſign of blowing it up with gun-powder.

Mines are either dug within the body of the earth, as thoſe made by the beſieged to blow up the works of the beſiegers, before they make a lodgment on the covert-way; or in eminences and riſing grounds, as to make a breach in the ramparts, &c. or to blow up walls, or laſtly, to tear up rocks.

Two ounces of powder have been found, by experiment, capable of raiſing two cubick feet of earth: conſequently 200 ounces, that is 12 pounds 8 ounces, will raiſe 200 cubick feet, which is only 16 feet ſhort of a cubick toiſe, becauſe 200 ounces joined together, have proportionably a greater force than 2 ounces, as being an united force.

All the turnings a minor uſes to carry on his mines, and through which he conducts the ſauciſſe, ſhould be well filled up with earth and dung; and the maſonry in proportion to the earth to be blown up, as 3 to 2. The entrance of the chamber of the mine ought to be firmly ſhut with thick planks, in the form of a St. Andrew's croſs, ſo that the encloſure be ſecure, and the void ſpaces ſhut up with dung, or tempered earth.

MINE, in natural hiſtory, a place under ground, where metals, minerals, or even precious ſtones, are dug up. As, therefore, the matter dug out of mines is various, the mines themſelves acquire various denominations, as gold-mines, ſilver-mines, copper-mines, iron-mines, diamond-mines, ſalt-mines, mines of antimony, of alum, &c. Mines, then, in general, are veins or cavities within the earth, whoſe ſides receding from, or approaching nearer to each other, make them of unequal breadths in different places, ſometimes forming larger ſpaces, which are called holes: they are filled with ſubſtances, which, whether metallick or of any other nature, are called the loads; when the ſubſtances forming theſe loads are reducible to metal, the loads are by the miners ſaid to be alive; otherwiſe they are called dead loads. In Cornwall and Devon, the loads always hold their courſe from eaſtward to weſtward; though in other parts of England, they frequently run from north to ſouth. The miners report, that the ſides of the load never bear in a perpendicular, but conſtantly under-lay, either to the north or to the ſouth. The load is frequently intercepted by the croſſing of a vein of earth, or ſtone, or ſome different metallick ſubſtance; in which caſe it generally happens that one part of the load is moved a conſiderable diſtance to the one ſide. This tranſient load is by the miners called flooking: and the part of the load which is to be moved, is ſaid to be heaved. See FLOOKING.

According to Dr. Nichols's obſervations upon mines, they ſeem to be, or to have been, the channels through which the waters paſs within the earth, and, like rivers, have their ſmall branches opening into them, in all directions. Moſt mines have ſtreams of water running through them; and when they are found dry, it ſeems to be owing to the waters having changed their courſe, as being obliged to it, either becauſe the load has ſtopped up the ancient paſſages, or that ſome new and more eaſy ones are made.

Mines, ſays Dr. Shaw, are liable to many contingencies; being ſometimes poor, ſometimes ſoon exhauſtible, ſometimes ſubject to be drowned, eſpecially when deep, and ſometimes hard to trace; yet there are many inſtances of mines proving highly advantageous for hundreds of years: the mines of Potoſi are to this day worked with nearly the ſame ſucceſs as at firſt; the gold-mines of Cremnitz have been worked almoſt theſe thouſand years; and our Corniſh tin-mines are extremely ancient. The neat profit of the ſilver alone, dug in the Miſnion ſilver-mines in Saxony, is ſtill, in the ſpace of eight years, computed at a thouſand ſix hundred and forty-four millions, beſides ſeventy-three tons of gold. Many mines have been diſcovered by accident; a torrent firſt laid open a rich vein of the ſilver mine at Friberg in Germany; ſometimes a violent wind, by blowing up trees; or overturning the parts of rocks, has diſcovered a mine; the ſame has happened by violent ſhowers, earthquakes, thunder, the firing of woods, or even the ſtroke of a plough ſhare, or a horſe's hoof.

But the art of mining does not wait for theſe favourable accidents, but directly goes upon the ſearch and diſcovery of ſuch mineral veins, ores, or ſands, as may be worth the working for metal. The principal inveſtigation and diſcovery of mines depend upon a particular ſagacity, or acquired habit of judging from particular ſigns, that metallick matters are contained in certain parts of the earth, not far below its ſurface. The principal ſigns of a latent metallick vein, ſeem reducible to general heads, ſuch as, 1. The diſcovery of certain mineral waters. 2. The diſcolouration of the trees or graſs of a place. 3. The finding of pieces of ore on the ſurface of the ground. 4. The riſe of warm exhalations. 5. The finding of metallick ſands, and the like. All which are ſo many encouragements for making a ſtricter ſearch near the places where any thing of this kind appears; whence rules of practice might be formed for reducing this art to a greater certainty. But when no evident marks of a mine appears, the ſkilful mineraliſt uſually bores into the earth, in ſuch places as from ſome analogy of knowledge, gained by experience, or by obſerving the ſituation, courſe, or nature of other mines, he judges may contain metal; this method of boring we have already given under the article BORING.

After this mine is found, the next thing to be conſidered, is whether it may be dug to advantage. In order to determine this, we are duly to weigh the nature of the place, and its ſituation, as to wood, water, carriage, healthineſs, and the like, and compare the reſult with the richneſs of the ore, the charge of digging, ſtamping, waſhing, and ſmelting.

Particularly the form and ſituation of the ſpot ſhould be well conſidered. A mine muſt either happen, 1. In a mountain. 2. In a hill. 3. In a valley. Or, 4. In a flat. But mountains and hills are dug with much greater eaſe and convenience, chiefly becauſe the drains and burrows, that is the adits or avenues may be here readily cut, both to drain the water and to form gang-ways for bringing out the lead, &c. In all the four caſes we are to look out for the veins which the rains, or other accidental thing, may have laid bare; and if ſuch a vein be found, it may often be proper to open the mint in that place, eſpecially if the vein prove tolerably large and rich; otherwiſe the moſt commodious place for ſituation is to be choſe for the purpoſe, viz. neither on a flat, nor on the tops of mountains, but on the ſides. The beſt ſituation for a mine, is a mountainous, woody, wholeſome ſpot; of a ſafe eaſy aſcent, and bordering on a navigable river. The places abounding with mines are generally healthy, as ſtanding high and avery where expoſed to the air; yet ſome places where mines are found, prove poiſonous, and can upon no account, be dug, though ever ſo rich: the way of examining a ſuſpected place of this kind, is to make experiments upon brutes, by expoſing them to the effluvia or exhalations to find the effects.

Devonſhire and Cornwall, where there are a great many mines of copper and tin, is a very mountainous country, which gives an opportunity in many places to make adits, or ſubterraneous drains, to ſome valley at a diſtance, by which to carry off the water from the mine, which otherwiſe would drown them out from getting the ore. Theſe adits are ſometimes carried a mile or two, and dug at a vaſt expence, as from 2 to 4000l. eſpecially where the ground is rocky; and yet they find this cheaper than to draw up the water out of the mine quite to the top, when the water runs in plenty, and the mine is deep. Sometimes, indeed, they cannot find a level near enough,

to

to which an adit may be carried from the very bottom of the mines; yet they find it worth while to make an adit at half the height to which the water is to be raiſed, thereby ſaving half the expence.

MINERAL, in natural hiſtory, in general, denotes foſſil, and is applied to any body dug out of the earth. In this ſenſe, minerals are divided into two claſſes; the one fuſible and malleable, which are what we properly call metals: The other wants theſe two properties, and are what we ſtrictly call minerals.

MINERAL, in a more accurate ſenſe, denotes a compound foſſil in which there is ſomething diſcovered, in all reſpects like metals, only that it is not malleable, joined with ſome other foſſil, as ſalt, ſulphur, ſtone, or earth: Such as antimony, cinnabar, biſmuth, &c.

Some aſcribe the formation of minerals to the action of the ſun without; ſome to the central fire within; and ſome think the cold does all by condenſing and congealing certain juices of the earth. See METAL.

The minerals, metals, and ſtones, lie in beds, ever ſince the flood, if not from the creation: yet it is highly probable they have a faculty of growing in their reſpective beds, as Mr. Boyle thinks. Among other inſtances, he adds, that, in the foreſt of Dean in Glouceſterſhire, the beſt iron, and in the greateſt quantities, are found in the old cinders, which they melt over again. This ſome impute to the negligence of former melters; but Mr. Derham thinks it rather owing to the impregnations of the old ore or cinders from the air.

The chymiſts generally take minerals to be nothing elſe but imperfect metals, which, not having arrived at maturity, may be perfected by chymical operations; which hath given riſe to the agreeable, but fatal deluſion of ſearching for the philoſopher's ſtone.

MINERAL *Waters*, ſuch as ſpring forth from under ground, and are found to be impregnated with ſome mineral matter, as ſalt, ſulphur, vitriol, &c. Of this kind are hot-baths, ſpaws, purging-ſprings, &c.

MINEROLOGY, that art which teaches the ways of finding, judging, and digging of mines, with the uſes of ſalts and earths for the making of fluxes, in order to the aſſaying and ſmelting ores for their metals.

MINERVALIA, in Roman antiquity, feſtivals celebrated in honour of Minerva, in the month of March; at which time the ſcholars had a vacation, and uſually made a preſent to their maſters, called from this feſtival minerval.

MINIATURE, a delicate kind of painting, diſtinguiſhed from all others by the ſmallneſs of the figures, its being performed with dots or points, inſtead of lines; by the faintneſs of the colouring; it requiring to be viewed very near: and by its being uſually done on ivory or vellum.

This is the niceſt and moſt tedious of all kinds of painting, being performed wholly with the point of the pencil: for when the colours are laid on flat without dotting, though the figures be ſmall, and the ground either vellum or paper, it is not called painting in miniature, but waſhing. There are ſome painters who never uſe any white colour in painting in miniature, but make the ground of the vellum ſerve to raiſe their figures; in which caſe the lights appear bright in proportion to the depth and ſtrength of the colours of the figures. Others, before they go to work, give the vellum a light waſh with white-lead well prepared and purified. Thoſe colours that have the leaſt body, are the beſt and moſt commodious for painting in miniature; as carmine, ultramarine, fine lakes, and greens made of herbs and flowers; but beſides theſe, the following colours are alſo made uſe of, viz. vermillion, black-lead, brown-red, yellow maſticote, indigo, ivory-black, lamp-black, ſpaniſh-brown, umber, gall-ſtone, brown-ochre, french-pink, orpiment, gamboge, naples-yellow, bladder-green, verditer, ſea-green, german aſhes, flake-white, and white-lead.

MINIM in muſick, a character of time, equal to two crotchets, or half a ſemi-breve. See CHARACTER.

MINIMA *Naturæ*, the primary particles of which bodies conſiſt, the ſame with corpuſcles or atoms.

MINIMUM, in mathematicks, denotes the leaſt quantity attainable in any given caſe. See the article MAXIMUM.

MINION, a piece of ordnance, of which there are two kinds; the large and ordinary; the large minion has its bore $3\frac{1}{4}$ inches diameter, and is 1000 pounds weight; its load is $3\frac{1}{4}$ pounds of powder; its ſhot three inches in diameter and $3\frac{1}{4}$ pounds weight; its length is eight feet, and its level range 125 paces. The ordinary minion is three inches diameter in the bore and weighs about 800 pounds weight. It is ſeven feet long; its load $2\frac{1}{2}$ pounds of powder; its ſhot near 3 inches in diameter, and weighs three pounds 4 ounces, and ſhoots point-blank 120 paces.

MINISTER, denotes one that ſerves God, the publick, or any private perſon. In the reformed church, thoſe ordained to preach, and do the other functions of the prieſthood, are ſimply called miniſters, paſtors, or miniſters of the goſpel: and among jeſuits, miniſter denotes the perſon next in order to the ſuperior of a houſe.

MINISTERS *of the Altar*, thoſe who aſſiſt the prieſt at the adminiſtration of the euchariſt.

MINISTER *of State*, he to whom a prince intruſts the adminiſtration of his government.

Foreign MINISTERS, are the ambaſſadors, envoys, agents, or reſidents in the courts of other princes. Of theſe there are two kinds, as miniſters of the firſt rank, who are called ambaſſadors, and envoys extraordinary; and miniſters of the ſecond rank, who are the ordinary reſidents. Thoſe of the firſt rank have a repreſentative character, which the others have not; though ſometimes the latter are inveſted with fuller powers than the former.

MINIUM, or RED-LEAD, a preparation of lead uſed both in pharmacy and painting. It is made in the following manner: melt lead in a broad earthen veſſel unglazed, and ſtir it continually with a ſpatula till it be calcined into a grey powder; this is called the calx of lead: continue the fire, ſtirring it in the ſame manner, and it becomes yellow; in this ſtate it is called maſticot: after this put it into a reverberatory furnace and it will calcine further, and become of a fine red, which is the common minium of red-lead. Minium is uſed externally on many occaſions. It obtunds the acrimony of the humours, allays inflammations, and is excellent in cleanſing and healing old ulcers; and on theſe occaſions, it is uſed in many of the plaſters and ointments of the ſhops.

In painting, red-lead is as heavy and ſtrong a colour as moſt we have: but when prepared, is the moſt delightful one. Mr. Boyle directs the preparing it as follows: put four ounces of it in a quart of rain-water; ſtir it, and pour off the water immediately, and let it ſettle to the bottom of the cup or glaſs you pour it into; decant the clear fluid, and in a day or two you will have the colour dry, and extremely fine.

MINOR, in law, denotes a perſon under age, or who has not arrived at the power of adminiſtering his own affairs, or the poſſeſſion of his eſtate. Among us, a perſon is a minor till the age of 21, before which time his acts are invalid. Yet, if a patron have a right of advowſon, he may preſent at the age of fourteen, and may, of himſelf, conſent to any proceſs relating to beneficiary matters.

MINOR, in logick, the ſecond propoſition of a ſyllogiſm called alſo the aſſumption.

MINOR, in muſick, denotes certain concords which are lower than others of the ſame denomination, by a leſs ſemi-tone, or 4 commas. Concords that admit of a major and Minor, are ſaid to be imperfect.

MINSTER, anciently denoted the church of a monaſtery or convent.

MINT, *Mentha*, in botany, a genus of plants, whoſe flower is monopetalous, and divided into four almoſt equal ſegments at the limb; it has no pericarpium, but the ſeeds, which are four in number, are contained in the bottom of the cup.

There are various ſpecies of mint, as ſpear-mint, pepper-mint, calimint, orange-mint, curled or criſp-mint, water-mint, with ſeveral others of leſs note; but the moſt uſeful are the ſpear-mint and pepper-mint, which are ſo well known, that a deſcription of them is unneceſſary; theſe ſpecies are cultivated in our gardens for culinary and medicinal purpoſes; they are eaſily propagated by parting their roots in the ſpring, or by planting cuttings of them in the ſummer months.

Both pepper and ſpear-mint are ſtomachick, cephalick, and carminative, excellent in the loſs of appetite, reach-

ings

alſo models for the building of ſhips, and for extraordinary ſtair-caſes, &c.

They alſo uſe models in painting and ſculpture; whence, in the academies, they give the term model to a naked man or woman, diſpoſed in ſeveral poſtures to give an opportunity to the ſcholars to deſign him in various views and attitudes.

MODERATOR, in the ſchools, the perſon who preſides at a diſpute, or in a publick aſſembly: thus, the preſident of the annual aſſembly of the church of Scotland, is ſtiled moderator.

MODERN, in a general ſenſe, ſomething new, or of our time, in oppoſition to what is antique or ancient.

MODIFICATION, in philoſophy, that which modifies a thing, or gives it this or that manner of being.

MODILLIONS, in architecture, are ornaments in the corniche of the Ionick, Corinthian, and compoſite columns. The modillions are little inverted conſoles or brackets, like an S, under the ſoffit of the corniche, ſeeming to ſupport the projecture of the larmier, though really no other than ornaments. The modillion is ſometimes called mutule; though the mutule be peculiar to the Dorick order, and the modillion to the higher orders. Modillions ſhould be placed over the middle of the column: they are particularly uſed in the Corinthian order, where they are enriched with ſculpture. The inter-modillions or diſtances between them depend on the intercolumniations, which oblige the modillions to be made of a certain length and breadth, to render the intervals perfect ſquares. They ſhould be ſo adjuſted, as that, when the orders are placed over one another, there be the ſame number in the upper as in the lower order, and that they fall perpendicularly over each other. Modillions are alſo uſed under the corniches of pediments, which ſome would have to repreſent purlins, and thoſe at the eaves, rafters. Daviler rather takes them for a kind of inverted conſoles or corbels.

MODIUS, in antiquity, a kind of dry meaſure among the Romans for ſeveral ſorts of grain. It contained 32 heminæ, or 16 ſextaries, or $\frac{1}{3}$ of the amphora, equivalent to the Engliſh peck.

MODULATION, in muſick, the art of keeping in and occaſionally changing the key, and returning to it again without offence to the ear. As to the manner in which the modulation from one key to another may be performed, ſo that the tranſition may be eaſy, no preciſe rules can be fixed; for though it be chiefly performed by the help of the ſeventh *g* of the key into which the harmony is to be changed, whether it be flat or ſharp; yet the manner of doing it is ſo extenſive, as no rules can circumſcribe. It may in general be conceived thus: The ſeventh *g* in either a ſharp or flat key is the third *g* to the fifth *f* of the key, by which the cadence in the key is chiefly performed; and, by being only a ſemitone under the key, is thereby the moſt proper note to lead into it. Inſomuch that the ſeventh *g* is never heard in any of the parts, but the ear expects the key ſhould ſucceed it; for, whether it be uſed as a third or a ſixth, it always affects us with ſo imperfect a ſenſation, that we naturally expect ſomething more perfect to follow, which cannot be more eaſily accompliſhed than by the ſmall interval of a ſemi-tone, to paſs into the perfect harmony of the key.

MODULE, in architecture, a certain meaſure for regulating the proportions of columns, and the ſymmetry or diſtribution of the whole building. Architects uſually chuſe the diameter or ſemi-diameter of the bottom of the column for their module; and this they ſubdivide into parts or minutes. There are two ways of determining the proportions of buildings; the firſt by a fixed ſtandard meaſure, which is uſually the diameter of the lower part of the column, called a module, ſubdivided into ſixty parts, called minutes. In the ſecond there are no minutes nor any certain diviſion of the module; but it is divided occaſionally into as many parts as are judged neceſſary. Both theſe manners, according to Perrault, have been practiſed by the ancient, as well as modern architects, but the ſecond, which was that chiefly uſed among the ancients, he thinks preferable.

MOGULS, or Monguls, hoards or tribes of vagrant Tartars, on the north of India, from whom the m[illegible]'s or ſovereigns of India, as well as of the Uſbeck-Tartars are deſcended.

MOHAIR, in commerce, the hair of a kind of goat, frequent about Angoura, in Turkey; the inhabitants of which city are all employed in the manufactures of camblets, made of this hair.

MOINEAU, in fortification, is a flat baſtion raiſed between two other baſtions, when a re-entering angle before a curtin is too long. The moineau is commonly joined to the curtin, but it is ſometimes ſeparated from it by a foſs, in which caſe it is called a detached baſtion. The moineau is not raiſed ſo high as the works of the place, becauſe it ought to be expoſed to the fire of the place in caſe the enemy ſhould lodge themſelves in it.

MOISTURE, a term ſometimes uſed to denote animal fluids, the juices of plants, or dampneſs of the air or other bodies.

Radical Moisture, among phyſicians, ſignifies a vital fluid, which nouriſhes and maintains life, as oil does a lamp.

MOLARES, or Dentes-Molares, in anatomy, the large teeth, called in Engliſh, grinders.

MOLE, *Talpa*, in zoology, makes a genus of quadrupeds, of the order of the feræ, thus characteriſed: the feet are formed like hands, and calculated for digging; and it has no external ears. Of this genus there are two ſpecies: 1. The common mole, a well known little animal, of a bluiſh black colour; very miſchievous to the farmers, by throwing up the ground of their paſtures. 2. The pointed tail-leſs mole, ſomewhat larger than the common kind: it is of a mixed colour, in which a purpliſh and yellowiſh tinge ſeem the prevailing ones. It is a native of Aſia, and lives under ground, like the common mole.

Mole, *Mola carnea*, in medicine, a maſs of fleſhy matter, of a ſpherical figure, generated in the uterus, or womb, and ſometimes miſtaken for a child. Its ſize is various, from that of a large nut to that of a fœtus. Some moles are ſoft and ſpongy, and others membraneous, with a cavity in the middle. Sometimes they are filled with ſerous matter, and ſometimes with hydatides.

Mole, *Moles*, is a maſſive work of large ſtones laid in the ſea by means of cofferdams, extending before a port, either to defend the harbour from the impetuoſity of the waves, or to prevent the paſſage of ſhips without leave.

MOLLUGO, baſtard-madder, in botany, a plant of the triandria-trigynia claſs, without any flower petals. Its fruit is a capſule of a ſomewhat oval figure, with three cells, in each of which there is a number of kidney-ſhaped ſeeds. It is ſaid to have the ſame medicinal virtues as madder.

MOLOSSES, in commerce, the thick fluid matter remaining after the ſugar is made, reſembling ſirup. See Sugar.

MOLOSSUS, in Greek and Latin poetry, a foot compoſed of three long ſyllables, as *delectant*.

MOLTA, or Moltura, a toll or duty formerly paid by vaſſals to their lord, for grinding their corn in his mill.

MOLTING, the change of feathers, hairs, or horns, in birds and beaſts.

MOMENT, in the doctrine of time, an inſtant, or the moſt minute and indiviſible part of duration. See the article Time.

Strictly ſpeaking, however, a moment ought not to be conſidered as any part of time, but only as the termination or limit thereof.

Moment, in the doctrine of infinites, denotes the ſame with infiniteſimal, or what is defined to be an infinitely ſmall quantity.

MOMENTUM, in mechanicks, ſignifies the ſame with impetus, or the quantity of motion in a moving body; which is always equal to the quantity of matter, multiplied into the velocity; or, which is the ſame thing, it may be conſidered as a rectangle under the quantity of matter and velocity. See Motion.

MOMORDICA, the wild cucumber, in botany, a genus of the monœcia-ſyngeneſia claſs of plants, with a monopetalous flower, divided into five ſegments: the fruit is an apple, burſting open with great elaſticity, and containing a number of compreſſed ſeeds. This genus comprehends the momordica and luffa of Tournefort, and the elaterium of Boerhaave: and indeed the elaterium

elaterium of the ſhops, a violent purge, is the fruit of this plant.

MONADELPHIA, in botany, a claſs of plants, the ſixteenth in order, ſo called becauſe the ſtamina of the flowers are ſo interwoven as to form one body; or rather, becauſe the ſtamina are connected, or coaleſce at the baſe.

MONANDRIA, in botany, a claſs of plants, the firſt in order, with only one ſtamen, or male part in each flower. The monandria are ſubdivided into two orders, which are denominated monandria-monogynia, and monandria-digynia, according as they contain one or two ſtyles.

MONARDIA, in botany, a genus of plants, with a monopetalous flower, the rim of which is ringent: the ſeeds are four in number, roundiſh, and contained in the bottom of the cup.

MONASTERY, a convent, or houſe built for the reception and entertainment of monks, mendicant friars, or nuns, whether it be an abbey, priory, &c.

MONASTICK, ſomething belonging to monks. See the article MONK.

MONDAY, *Dies Lunæ*, the ſecond day of the week, ſo called as being anciently ſacred to the moon, q. d. moon-day.

MONEY, *Moneta*, a piece of matter, commonly metal, to which publick authority has affixed a certain value and weight to ſerve as a medium in commerce. Money is uſually divided into real and imaginary. Real money includes all coins, whether gold, ſilver, copper, or the like; ſuch as guineas, crowns, piſtoles, pieces of eight, ducats, &c. Imaginary money, or money of account, is that which has never exiſted, or, at leaſt, which does not exiſt in real ſpecie; but is a denomination invented or retained to facilitate the ſtating of accounts, by keeping them ſtill on a fixed footing, not to be changed like current coins, which the authority of the ſovereigns ſometimes raiſes or lowers according to the exigencies of the ſtate, of which kinds are pounds, livres, marks, maravedes, &c.

MONEYERS, MONEYORS, or MONIERS, officers of the mint, who work and coin gold and ſilver money, and anſwer all waſte and charges.

MONITORY LETTERS, are letters of warning and admonition, ſent from an eccleſiaſtical judge, upon information of ſcandals and abuſes, within the cognizance of his court.

MONK, a perſon who wholly dedicates himſelf to the ſervice of religion, in ſome monaſtery, under the direction of ſome particular ſtatutes and rules. The moſt probable account of the original of the monks is, that in the Decian perſecution, in the middle of the third century, many perſons in Egypt, to avoid the fury of the ſtorm, fled to the neighbouring deſarts and mountains, where they not only found a ſafe retreat, but alſo more time and liberty to exerciſe themſelves in acts of piety and divine contemplations; which ſort of life became ſo agreeable, that when the perſecution was over, they refuſed to return to their habitations again, chooſing rather to continue in thoſe cottages and cells, which they had made for themſelves in the wilderneſs. From that time to the reign of Conſtantine, monachiſm was confined to the hermits or anachorets, who lived in private cells in the wilderneſs; but when Pachomius had erected monaſteries, other countries preſently followed the example.

MONOCHORD, a muſical inſtrument, compoſed of one ſtring, to try the variety and proportion of muſical ſounds. The ancient monochord conſiſted of a rule divided and ſubdivided into divers parts, whereon there was a ſtring pretty well ſtretched upon two bridges, at each extremity. In the middle was a moveable bridge, called magas, whereby, in applying it to the different diviſions of the line, the ſounds were found to be in the ſame proportion to one another, as the diviſions of the line cut by the bridge were. It is called the harmonical canon, as ſerving to meaſure the degrees of gravity and acuteneſs of ſounds.

MONODY, in ancient poetry, a mournful kind of ſong, ſung by a perſon all alone to give vent to his grief.

MONOECIA, in botany, one of Linnæus's claſſes of plants, the twenty-firſt in order; in which the male and female flowers are placed ſeparately on the ſame plant, or rather on different ſtalks growing from the ſame root. Of the plants belonging to this claſs, ſome have only one ſtamen, and others have three, four, five, ſix, or more ſtamina; whence the ſubordinate orders of monoecia-monandria, monoecia-triandria, &c. others again are monadelphous, others ſyngeneſious, and others gynandrous.

MONOGRAM, a character or cypher, compoſed of one, two, or more letters, interwoven; being a kind of abbreviation of a name, anciently uſed as a ſeal, badge, arms, &c.

MONOLOGUE, a dramatick ſcene, in which a perſon appears alone on the ſtage, and ſpeaks to himſelf.

MONOMIAL, in algebra, a root or quantity, that has only one name or member, as $a\,b$, $a\,a\,b$, &c. A monomial may be either rational or irrational.

MONOPETALOUS, in botany, is applied to flowers that have only one undivided leaf.

MONOPOLY, in commerce, denotes when a perſon makes himſelf ſole maſter of a commodity, manufacture, &c. in order to enhance the price thereof. There are two kinds of monopoly, when a perſon buys up corn, &c. to retail it again at an advanced price; or when a patent is procured, prohibiting any other perſon to ſell a certain commodity but the patentee.

MONOPTERE, in architecture, a kind of temple, round, and without walls, having a dome ſupported by columns.

MONOPTOTON, in grammar, a noun that has only one caſe, as inficias.

MONOPYRENEOUS, in botany, ſuch fruit as contains only one ſeed or kernel.

MONORHYME, a piece of poetry, in which all the verſes end with the ſame rhyme.

MONOSTICH, an epigram that conſiſts of only one ſingle verſe.

MONOSYLLABLE, in grammar, a word that conſiſts of only one ſyllable, and is compoſed of either one or more letters pronounced at the ſame time.

MONOTHELITES, a ſect of Chriſtians in the ſeventh century, ſo called from their maintaining that, though there were two natures in Jeſus Chriſt, the human and divine, there was but one will, which was the divine.

MONOTONY, an uniformity of ſound, or a fault in pronunciation, when a long ſeries of words are delivered in one unvaried tone.

MONSOON, in phyſiology, a ſpecies of trade-wind, in the E. Indies, which for ſix months blows conſtantly the ſame way, and the contrary way the other ſix months. See WIND.

MONSTER, *Monſtrum*, in general, denotes any production that deviates from the ſpecies to which it belongs, whether with reſpect to the number or diſpoſition of its parts; in which ſenſe, a man with ſix fingers on each hand, or ſix toes on each foot, is a monſter. But the term monſter ſeems to be chiefly applied to ſuch productions as deviate very much from the ordinary courſe of nature.

MONSTRANS *de Droit*, a writ iſſuing out of Chancery, for reſtoring a perſon to lands or tenements that are his by right, though found in the poſſeſſion of another lately dead.

MONSTRAVERUNT, a writ which lies for a tenant who holds by free charter in ancient demeſne, upon being diſtrained for the payment of any ſervice contrary to the liberty he either does or ought to enjoy.

MONTH, *Menſis*, the twelfth part of a year.

There are divers kinds of years and months, according to the particular luminary, by whoſe revolutions they are determined, and the particular purpoſes for which they are deſtined, as ſolar months, lunar months, civil months, &c.

Solar MONTHS, is the ſpace of time wherein the ſun moves through an entire ſign of the ecliptick. Hence, the ſolar months will be unequal; ſince the ſun is longer in paſſing through the ſummer ſigns than thoſe of the winter. But as he travels through all the twelve in 365 days, 5 hours, 49 minutes, the quantity of a mean month will be had by dividing that number by 12. On this principle the quantity of a ſolar month will be found 30 days, 10 hours, 29 minutes, 5 ſeconds.

Lunar MONTHS, are either ſynodical, periodical or illuminative.

Lunar synodical MONTH, lunar month, or lunation, is the space of time between two conjunctions of the moon with the sun, or betwixt two new moons. This month, according to mean motion, is 29 days, 12 hours, 44', 3'', 11'''.

Lunar periodical MONTH, the space of time wherein the moon makes her revolution through the zodiack, or wherein she returns to the same point. This month, according to mean motion, is 27 days, 7 hours, 43', 8''. The antient Romans made use of lunar months, that alternately consisted of 29 and 30 days. They had three terms in each month, viz. calends, nones, and ides.

Lunar illuminative MONTH, the space from the first time of the moon's appearance after a new moon, to her first appearance after the new moon following. The quantity of this month it not always the same. By this the Turks and Arabs compute their time.

Astronomical or *natural* MONTH, is that measured by some exact interval corresponding to the motion of the sun or moon, as the solar and lunar months.

Civil or *common* MONTH, an interval of a certain number of whole days, approaching nearly to the quantity of some astronomical month, either solar or lunar.

Civil lunar MONTHS, consist alternately of 29 and 30 days: so that two of these months will be equal to two astronomical ones, abating for the odd minutes: and, consequently, the new moon will be hereby kept to the first day of each such civil month for a long time together. However, to make them keep constant pace together, at the end of each 948 months, a month of 29 days must be added; or else every 33d month must consist of thirty days. This month was in use among the Jews, Greeks, Romans, till the time of Julius Cæsar.

Civil solar MONTHS, are to consist alternately of 30 and 31 days, except one month, which, for every fourth year, should consist of 30 days, and the other years 29. This form was introduced by Julius Cæsar. Under Augustus, the Sextilis or 6th month was denominated Augustus in honour of him; and, to make the compliment still greater, a day was added thereto, so that it now consisted of 31 days: to make up for which a day was taken from February, so that henceforward it had only 28 days, and every third year 29, though before it commonly consisted of 29.

Philosophical MONTH, in chymistry, the space of 40 days and nights.

MONT *Pagnote*, in fortification, an eminence where persons post themselves out of the reach of cannon, to see a camp, siege, battle, &c. without being exposed to danger: it is also called the post of the invulnerable.

MONUMENT, in architecture, a building destined to preserve the memory of something remarkable, such as a triumphal arch, mausoleum, pyramid, &c. The first monuments among the antients were their tombstones. Such as were square in their base, and equally deep throughout their whole length, the Greeks called στήλας: hence were derived our square pilasters or Attick columns. They called those στύλοι, which, being round in their base, ended in a point at top: hence diminished columns. Pyramids were those square at the foot, terminating in a point at top, in manner of a funeral pile. And obelisks were those whose bases were more in length than breadth, and which rose gradually diminishing to a very great height, like the spits for roasting the flesh of their sacrifice, called obeli, ὀβελοί.

The monument, in London, is a magnificent pillar, erected by order of parliament, in memory of the burning of the city, anno 1666, in the very place where the fire begun. It is of the Dorick order, 202 feet high from the ground, 15 feet in diameter; all of solid Portland stone, with a stair-case in the middle of black marble. The pedestal is 21 feet square, and 40 high, the front being adorned with curious basso relievos, and inscriptions, &c. which denote the purport of its erection.

MOOD, *Syllogistick* MOOD, in logick, a proper disposition of the several propositions of a syllogism in respect of quantity and quality: that is, such wherein the antecedent being true, the consequent, in virtue of the form, cannot be false. There are two kinds of moods, the one direct, and the other indirect.

Direct MOOD, is that wherein the conclusion is drawn from the premisses directly and immediately, as every animal is a living thing; every man is an animal: therefore, every man is a living thing.

Indirect MOOD, that wherein the conclusion follows from the premisses not immediately, but by means of a conversion, as every animal is a living thing; every man is an animal; therefore, some living thing is a man. There are 14 direct moods, belonging to the first figure; 4 to the 2d, and 6 to the 3d. They are denoted by so many artificial words, viz. 1. Barbara, celarent, darii, ferioque. 4. Baralip, celantes, dabitis, fapismo frisesom. 2. Cesare, camestres, festino, baroco. 3. Darapti, selapton, disamis, datisi, bocardo, ferison. Each word consists of three syllables, denoting the three propositions of a syllogism, as major, minor, and conclusion. The vowel A denotes an universal affirmative proposition; E an universal negative; I a particular affirmative; and O a particular negative.

MOOD, in grammar, denotes the different manners of conjugating verbs, according to the different actions or affections to be expressed, as shewing, commanding, wishing, &c. Hence arise 5 moods, the indicative, imperative, optative, subjunctive, and infinitive.

MOON, *Luna*, ☽, in astronomy, a satellite, or secondary planet, always attendant on our earth. Astronomers have drawn the face of the moon, according as it is seen with the best telescopes; for which we are obliged to the accurate labours of the famous selenographers, Florentius, Langrenus, John Hevelius of Dantzick, Grimaldus and Ricciolus, Italians; who have taken particular care to note all the shining parts of the moon's face, and, for the better distinguishing them, they have given to each part a proper name. Langrenus and Ricciolus have divided the lunar regions among the philosophers and astronomers, and other eminent men; but Hevelius, fearing lest the philosophers should quarrel about the divisions of the lands, has spoiled them of this their property, and given the parts of the moon those geographical names that belong to the different islands, countries, and seas of our earth, without any regard to their situation and figure. (See *plate* LVIII. *fig.* 2.)

That the surface of the moon is not smooth or even, but diversified with hills and vales, continents and seas, lakes, &c. any one would imagine, who views her face through a large telescope. That she has a variety of hills and mountains is demonstrable from the line which bounds the light and dark parts not being an even and regular curve, as it would be upon a smooth spherical surface, but an irregular broken line, full of dents and notches. Also because some small, and many large bright spots appear in the dark portion, standing out at several distances from the boundary line; which spots in a few hours become larger, and at last unite with the enlightened portion of the disk.

On the other hand, we observe many small spots interspersed all over the bright part, some of which have their dark sides next the sun, and their opposite sides very bright and circular, which infallibly proves them to be deep, hollow, round cavities; of which there are two very remarkable ones near together on the upper part, and may be viewed exceedingly plain, when the moon is about four or five days old. The depth of these lunar cavities prodigiously exceeds the height of the mountains, and consequently the surface of the moon has but little resemblance to that of the earth in these respects.

Since, then, the moon's surface appears to be so very mountainous and irregular, it has been a question, how it comes to pass that the bright circular limb of the disk does not appear jagged and irregular, as well as the curve bounding the light and dark parts: in answer to this, it must be considered that, if the surface of the moon had but one row of mountains placed round the limb of the disk, the said bright limb would then appear irregularly indented; but since the surface is all over mountainous, and since the visible limb is to be considered not as a single curve line, but a large zone, having many mountains one behind another, it is evident the mountains in some rows being opposite to the vales in others, will fill up the inequalities in the visible limb in the remoter parts, which diminish to the sight and blend with each other, so as to constitute, like the waves of the sea, one uniform and even horizon. Whether there be seas, lakes, &c. in the moon, has been a question long debated

Plate LVIII

facing Moon

debated, but now concluded in the negative: for in those large, dark regions, which were thought to be seas, we view, through a good telescope, many permanent bright spots, as also caverns and empty pits, whose shadows fall within them, which can never be seen in seas or any liquid substance. Their dark and dusky colour may proceed from a kind of matter or soil, which reflects light less than that of the other regions. These spots have continued always the same unchangeably since they were first viewed with a telescope; though less alterations than what happen in the earth, in every season of the year, by verdure, snow, inundations, and the like, would have caused a change in their appearance. But indeed as there are no seas nor rivers in the moon, and no atmosphere, so of course there can be no clouds, rain, snow, or other meteors, whence such changes might be expected.

The moon has no atmosphere; for were there an atmosphere of air like ours, it must necessarily obscure the fixed stars in the moon's appulse to them; but it has been observed that this never happens: on the contrary, they preserve all their splendor to the moment of their occultation, and then disappear instantaneously, and in the same manner they recover their light, when they appear again on the other side.

The distance of our moon from the earth is determined by her horizontal parallax, or the angle which the semi-diameter of the earth subtends at the moon, viz. the angle A O C (*plate* LVIII. *fig*. 3.) which is the difference between the true place of the moon's centre O, when in the horizon, and the apparent place thereof, as viewed from the surface of the earth at A. The former is known by astronomical tables, the latter by observation: and the quantity of this difference, or angle, at a mean, is $57' \, 12'' = AOC$.

If therefore we say, as the tangent of $57' \, 12''$ is to radius, so is $AC = 1$ to $CO = 60{,}1$; this will be the mean distance of the moon in semidiameters of the earth. Therefore, since one semidiameter of the earth contains 3982 miles, we have $3982 \times 60{,}1 = 239318{,}2 = CO$, the mean distance of the moon.

The moon's apparent semidiameter M O measures, at her mean distance, $15' \, 38'' = 938$ by the micrometer, which is the quantity of the angle M C O. The earth's diameter, therefore, is to the moon's, as $3432''$ to $938''$; that is, as 109 to 30, or, as 3,63 to 1. Wherefore, $\frac{30}{109} \times 7964 = 2192$ miles the moon's diameter.

Therefore the face of the earth, as it appears to the lunarians, is to the face of the moon, as it appears to us, as 109×109 to 30×30, viz. as 11881 to 900, or as 12,2 to 1. And the real bulk of the earth is to that of the moon as $109 \times 109 \times 109$ to $30 \times 30 \times 30$, viz. as 1295029 to 27000, that is as 1295 to 27, or as 48 to 1 very nearly.

Since, as we have shewn, the mean distance of the moon is about 60 semi-diameters of the earth, at the distance of the moon one degree of the earth's surface will subtend an angle of one minute, and will therefore be visible; but such a degree is equal to $69\frac{1}{2}$ miles; therefore a spot or place of 70 miles in diameter, in the moon, will be just visible to the naked eye. Hence a telescope that magnifies about 100 times, will just discover a spot whose diameter is $\frac{1}{100}$ of 70 miles, or $\frac{7}{10}$ of a mile of 3698 feet: and a telescope that will magnify 1000 times, will shew an object that is but $\frac{7}{100}$ of a mile, that is, whose diameter is but 370 feet, or little more than 120 yards; and therefore will easily shew a small town or village, or even a gentleman's seat, if any such there be.

The time which the moon takes up in making one revolution about the earth, from a fixed star to the same again, is 27d. 7h. 43′, which is called the periodical month. But the time that passes between two conjunctions, that is, from one new moon to another, is equal to 29d. 12h. 44′, 3″, which is called a synodical month: for, after one revolution is finished, the moon has a small arch to describe to get between the sun and the earth, because the sun keeps advancing forward in the eclip tick. Now this surplus of motion takes up 2d. 5h. 1′, 3″, which added to the periodical month, makes the synodical, according to the mean motions.

The moon moves about its own axis in the same time that it moves about the earth, from whence it comes to pass that she always shews the same face to us: for by this motion about her axis, just so much of her surface is turned towards us constantly, as by her motion about the earth would be turned from us.

But since this motion about the axis is equable and uniform, and that about the earth, or common centre of gravity, is unequal and irregular, as being performed in an ellipsis, it must follow that the same part of the moon's surface, precisely, can never be shewn constantly to the earth; and this is confirmed by the telescope, through which we often observe a little gore or segment, on the eastern and western limb appear and disappear by turns, as if her body librated to and fro; which therefore occasioned this phænomenon to be called the moon's libration. The orbit of the moon is elliptical, more so than any of the planets, and is perpetually changing and variable, both in respect of its figure and situation. The inclination of the moon's orbit to the plane of the ecliptick is also variable, from 5° to 5° 18′. The line of the nodes likewise has a variable motion from east to west, contrary to the order of the signs, and completes an entire revolution in a space of time a little less than 19 years. Also the line of the apsides, or of the apogee and perigee, has a direct motion from west to east, and finishes a revolution in the space of about 19 years.

The phases of the moon in every part of the orbit, are easily accounted for from her different situation with respect to the earth and sun: for, though to an eye placed in the sun she will always exhibit a complete illuminated hemisphere, yet in respect to the earth, where the hemisphere is viewed in all degrees of obliquity, it will appear in every degree from the greatest to the least; so that at E (*fig*. 4 and 5.) no part at all of the enlightened surface can be seen. At D, a little part of it is turned towards the earth, and from its figure it is then said to be horned. At C, one half of the enlightened surface is turned to the earth, and she is then said to be dichotomised, and in her first quarter or quadrature. At B, a part more than half is turned to the earth, and then she is said to be gibbous. At A, her whole illuminated hemisphere is seen, being then in opposition to the sun; and this is called the full moon. At H, she is again gibbous, but on the other part: at G she is again dichotomised, and in her last quarter: at F she is horned, as before; and then becomes new again at E, where she is in conjunction with the sun. If M N be drawn perpendicular to the line S L joining the centres of the sun and moon, and O P perpendicular to the line T L joining the centres of the earth and moon, it is evident that the angle P L N in the first half of the orbit, and O L M in the second, will be proportional to the quantity of the illuminated disk turned towards the earth; and this angle is every where equal to the angle E T L, which is called the elongation of the moon from the sun.

To find what quantity of the moon's visible surface is illustrated for any given time, we are to consider that the circle of illumination B F C, (*fig*. 6.) is oblique to the view every where, but at E and A; and therefore by the laws of the orthographick projection, it will be projected into an ellipse, whose longest axis is the diameter of the moon B C, and the semi-conjugate is F L cosine of the angle of elongation F B P. Hence $FP =$ versed sine of the said angle. But from the nature of the circle and ellipse, we have L P in a constant ratio to F P, wherever the line O P is drawn perpendicular to B; therefore also $2 \, LP = PO$ has a constant ratio to F P. But (by Euclid V. 12.) the sum of all the lines $OP =$ area of the circle is to the sum of all the lines $FP =$ area of the illuminated part, as the diameter of the circle O P to the versed sine of the elongation F P.

As the moon illuminates the earth by a reflex light, so does the earth the moon; but the other phænomena will be different for the most part. 1. The earth will be visible but to little more than one half of the lunar inhabitants. 2. To those who see it, the earth appears fixed, or at least to have no circular motion, but only that which results from the moon's libration. 3. Those who live in the middle of the moon's visible hemisphere, see the earth directly over their heads. 4. To those who live in the extremity of that hemisphere, the earth seems always nearly in the horizon, but not exactly there, by reason of the libration. 5. The earth, in the circle of a month, would have all the same phases as the moon has.

Thus

Thus the lunarians, when the moon is at E, in the middle of their night, fee the earth at full, or fhining with a full face; at C and G it is dichotomifed or half light and half dark; at A it is wholly dark or new; and at the parts between thefe it is gibbous. 6. The earth appears variegated with fpots of different magnitudes and colours, arifing from the continents, iflands, oceans, feas, clouds, &c. 7. Thefe fpots will appear conftantly revolving about the earth's axis, by which the lunarians will determine the earth's diurnal rotation, in the fame manner as we do that of the fun.

The age of the moon may be eafily found by this general RULE.

Add the epact, the day of the month, and the number for the month together; if the fum be lefs than 30, it is the moon's age required; but if greater than 30, take 30 from it, and the remainder is the anfwer to the queftion. The numbers for the months are, January, 0; February, 2; March, 1; April, 2; May, 3; June, 4; July, 5; Auguft, 6; September, 8; October, 8; November, 10; December, 10.

EXAMPLE.

What is the moon's age on the eighth of March, 1778.

Epact — —	14
Number of the month	1
Day of the month	8
	23 The moon's age.

To find the time of the MOON's *beginning to fhine.* Multiply her age, if under 15, by 48, and divide the product by 60; the quotient gives the hour, and the remainder the minute. If her age be above 15 days, fubtract the time thus found from 24; the remainder gives the time of fhining in the morning.

MOON-WORT, fee LUNARIA.

MOORING, at fea, the laying out of anchors in a proper place for the fecure riding of a fhip.

MOOR's-HEAD, in chymiftry, a copper cap made in form of a head, and fet over the chimney of a reverberating furnace.

MOOR's-*Head,* alfo denotes the head of a copper or glafs ftill or alembick, which is luted on to the body or cucurbit, with a beak or pipe to let the fpirit run down into the receiver.

MOOT, a difficult cafe argued by the young barrifters and ftudents at the inns of Court, by way of exercife, the better to qualify them for practice, and to defend the caufes of their clients. This, which is called mooting, is the chief exercife of the inns of Court. Particular times are appointed for the arguing moot-cafes: the place where this exercife is performed, was anciently called Moot-hall; and there is a bailiff, or furveyor of the moots annually chofen by the bench, to appoint the moot-men for the inns of Chancery, and to keep an account of the performance of exercifes.

MORALS, any thing relating to the manners or conduct of life.

MORAL *Actions*, are fuch as render the agent good or evil; and confequently rewardable and punifhable accordingly.

MORAL *Certainty* or *Affurance*, denotes a very ftrong probability, in contradiftinction to a mathematical demonftration.

MORAL *Impoffibility*, a very great and almoft infuperable difficulty, in oppofition to a phyfical impoffibility.

MORAL *Philofophy*, *Ethicks* or *Morality*, a fcience which directs and forms men's manners, explains the reafon and nature of actions, and teaches us how to acquire that felicity which is agreeable to human nature.

MORAL *Senfe*, the faculty whereby we difcern what is good, virtuous, &c. in actions, manners, characters, &c.

MORAL *Theology*, cafuiftry, or cafuiftical divinity, that which treats of cafes of confcience.

MORAL *of a Fable*, the inftruction drawn from it, with which it concludes.

MORALITY, a conformity in things and actions to thofe unalterable obligations which refult from the nature of our exiftence, and the neceffary relations of life, whether to God as our creator, or to mankind as our fellow-creatures. It alfo denotes the fcience of morals.

Notwithftanding the great obfcurity in the moral fcience, Mr. Locke is of opinion, that the doctrine of manners is equally capable of demonftration with the doctrine of quantity and number.

According to this author, the idea of a fupreme being, infinite in power, goodnefs, and wifdom, whofe workmanfhip we are, and on whom we depend, and the idea of ourfelves, as underftanding rational creatures, would, if duly confidered, afford fuch foundations of our duty and rules of action, as might place morality among the fciences capable of demonftration.

What has given the advantage to the ideas of quantity, and made them thought more capable of certainty and demonftration than the ideas of good and evil, right and wrong, &c. is, 1. That the former can be reprefented by fenfible marks, as diagrams, which have a nearer correfpondence with them than any words. 2. Moral ideas are commonly more complex than figures, whence it follows, 1. That their names are of more uncertain fignification. 2. The mind cannot eafily retain thofe precife combinations fo exactly and perfectly, as is neceffary in the examination of the habitudes and correfpondences, agreements or difagreements, of feveral of them one with another.

One part of thefe difadvantages in moral ideas may in a good meafure be remedied by definitions, fetting down that collection of fimple ideas which every term fhall ftand for, and then ufing the term fteadily for that precife collection.

The mathematician confiders the properties belonging to a rectangle, &c. only as they are ideas in his own mind, which poffibly he never found precifely true; yet his knowledge is not only certain but real, as things really agree to thofe archetypes in the mind.

But it will be faid, that if moral knowledge be placed in the contemplation of our own moral ideas, and thofe are of our own making, what ftrange notions will there be of juftice and temperance? &c. It is anfwered, no diforder at all in the things themfelves, nor the reafonings about them, no more than there would be a change in the properties of figures, and their relations, if a man fhould make a triangle with four corners, or a trapezium with four right angles, that is, change the names of the figures; the change of name will indeed difturb a man at firft, but, as foon as the figure is drawn, the confequences and demonftrations are plain and clear.

It is juft the fame in moral knowledge. We are to take notice of one thing, that, where God or any other law-maker has defined any moral names, there they have made the effence of that fpecies to which that name belongs, and there it is not fafe to apply it otherwife, but, in other cafes, it is bare impropriety of fpeech to apply them contrary to the common ufage of the country they are ufed in.

MORASS, MOOR, marfhy or fenny low grounds, on which waters are lodged.

In Scotland, Ireland, the north of England, &c. they have a peculiar kind of moraffes, called peat-moffes, from which peat and turf for fuel are dug.

In the Philofophical Tranfactions, the Earl of Cromartie gives a particular account of thefe moffes. They are covered with a heathy fcurf, under which is a black, moift fpongy earth, ordinarily from three or four to feven or eight feet in depth, though in fome places twice or thrice as much. This earth is cut horizontally into oblong fquares with iron fpades for that purpofe, and are eight or nine inches long, and four or five broad, which are dried in the fun in piles made for that purpofe. The more black and folid the peat, the better firing. Moffes are always level, though frequently found on hills, and near the tops too; yet, he obferves that moffes have always a defcent to them, and generally from them, infomuch that he never knew the water might ftagnate. It is the water draining from above, that feems to be the parent of peat. In many of thofe moffes are found quantities of fir and oak wood, commonly whole trees; whence it appears there muft have been ftanding woods here formerly. To prove this that noble lord gives us the hiftory and origin of a mofs, in a great meafure from his own experience, in the parifh of Lochbroom.

MORBID, *Morbidus*, in medicine, is applied to thofe parts, humours, &c. where fome difeafe lies.

MORBID, in painting, is particularly applied to fat flefh very ftrongly expreffed.

MORESK, or MORISCO, is a kind of painting, carving,

carving, &c. done after the manner of the moors; confifting of feveral grotefque pieces and compartments, promifcuoufly mingled, not containing any perfect figure of a man, or other animal; but a wild refemblance of birds, beafts, trees, &c.

Moresk-*Dances*, vulgarly called morrice-dances, are thofe altogether in imitation of the moors, as farabands, chacons, &c. which are generally performed with caftenets or tambours.

MORINA, in botany, a plant of the diandria-monogynia clafs, with a monopetalous flower, bilabiated at the limb: the feed is fingle, roundifh, and coronated with the cup of the flower.

MORINDA, in botany, a genus of the pentandria-monogynia clafs of plants, with an infundibuliform monopetalous flower, divided into five fegments at the limb: the fruit is a roundifh berry, with an umbilicated point, and contains two elliptico-hemifpherical feeds.

MORISONA, in botany, a genus of plants, the flower of which confifts of four oblong petals: the fruit is a globofe berry, containing a great many kidney-fhaped feeds.

MORNING, the beginning of the day, the firft appearance of light, or the time from midnight till noon.

MOROCCO, *Marroquin*, in commerce, a fine kind of leather, prepared of the fkin of an animal of the goat kind, and imported from the Levant, Barbary, &c.

The following proceffes for dying leather red and yellow, as practifed in Turkey, with directions for the preparation and tanning the fkins; were communicated to the Society for the Encouragement of Arts, &c. by Mr. Philippo: for which they gave him 100l. and alfo prefented him with a gold medal of the fociety.

Article I. Firft preparation of the fkins, both for the red and yellow dyes, by dreffing them in lime.

Let the fkins, dried with the hair on, be firft laid to foak in clean water, for three days. Let them be broken over the flefh fide, put into frefh water, for two days longer, and afterwards hung up to drain half an hour. Let them now be broken again on the flefh fide, limed with cold lime on the fame fide, and doubled together with the grain fide outward. In this ftate they muft be hung up within doors over a frame, for five or fix days, till the hair be loofe; which muft then be taken off; and the fkins returned into the lime-pit for about three weeks. Take them out, and let them be well worked, flefh and grain, every fixth or feventh day during that time: after which let them be wafhed ten times in clean water; changing the water at each wafhing. They are next to be prepared in drench, as below mentioned.

Article II. Second preparation of the fkins, for both the red and yellow dyes, by drenching.

After fqueezing the water out of the fkins, put them into a mixture of bran and water, new milk warm, in the following proportions: viz. about three pounds of bran for five fkins; and water fufficient to make the mixture moderately fluid: which will be about a gallon to each pound of bran. In this drench fuffer the fkins to lie three days, at the end of which time they muft be well worked, and afterwards returned into the drench for two days longer. They muft then be taken out, and rubbed between the hands; the water fqueezed from them; and the bran fcraped off clean from both fides of the fkins. After this they muft be again wafhed ten times in clean water; and the water fqueezed out of them. Thus far the preparatory procefs of all the fkins, as well thofe to be dyed red, as yellow is the fame: but, afterwards, thofe that are to be red muft be treated as follows.

Article III. Preparations, in honey and bran, of the fkins that are to be dyed red.

Mix one pound of honey with three pints of lukewarm water; and ftir them together till the honey be diffolved. Then add two double handfuls of bran: and, taking four fkins, (for which this quantity will be fufficient) work them well in it one after another. Afterwards fold up each feparately into a round form, with the flefh fide outward, and lay them in an earthen pan, or other proper veffel, if in fummer, by the fide of each other; and if in winter, on the top of each other. Place the veffel in a floping pofition, fo that fuch fluid as will fpontaneoufly drain out of the fkins may run from them. An acid fermentation will then arife in the liquor: and the fkins will fwell confiderably. In this ftate they muft continue about feven or eight days: but the moifture that drains from them muft be poured off once or twice a day, as neceffity may require. After this a further preparation in falt is neceffary: which is to be performed in the following manner.

Article IV. Preparation in falt of the fkins to be dyed red.

After the fkins have been fermented in the honey and bran, as above-mentioned, let them be taken out of that mixture on the eighth or ninth day, and well rubbed with dry common fea-falt, in the proportion of about half a pound to each fkin: which muft be well rubbed, and worked into them. This will make them contract again; and part with a further confiderable quantity of moifture; which muft be fqueezed out by drawing each fkin feparately through the hands. They muft next be fcraped clean, on both fides, from the bran and fuperfluous falt and moifture that may adhere to them; after which, frefh dry falt muft be ftrewed over the grain fide, and well rubbed in with the hands. They are then to be doubled, with the flefh fide outward, lengthwife, from tail to tail: and more dry falt muft be thinly ftrewed over the flefh-fide; and rubbed in. For which two laft operations, about a pound and a half of falt will be fufficient for each fkin. They muft then be put thus, folded on each other, between two clean boards, placed floping breadth-wife; and a heavy weight laid on the upper board, in order gradually to prefs out what moifture they will thus part with. They muft be then continued, in this ftate of preffure, two days, or longer, till it be convenient to dye them: for which they will then be duly prepared.

Article V. Preparation of the red dye, in the proper proportion for four fkins; and the manner of application of it in dying the fkins.

Put eight gallons of water in a copper, with feven ounces of fhenan tied up in a linen bag. Light a fire under the copper: and, when the water has boiled about a quarter of an hour, take out the bag of fhenan; and put into the boiling fluid or lixivium, 1ft, Two drams of alum. 2dly, Two drams of pomegranate bark. 3dly, Three quarters of an ounce of turmerick. 4thly, Three ounces of cochineal. 5thly, Two ounces of loaf fugar. Then let the whole mixture boil about fix minutes afterwards, over the fire.

The fhenan, mentioned above, is a drug commonly ufed in dying, in the Eaft; and very eafily to be obtained at any of the ports of Afia and Africa, in the Levant. It is the Eaftern jointed kali, called by botanifts, felicornia: which grows in great plenty on the fea-coaft, in thofe and other parts of the Eaft. There is a lefs fpecies of the felicornia on our coafts, particularly in Lincolnfhire; which, from its very great affinity to the fhenan, might be prefumed to have the fame qualities. On fome trials, it has not, however, appeared to anfwer the end of the fhenan. But it is proper to purfue the examination of this further; as fome unknown circumftances in the collecting or ufing the Englifh felicornia, might occafion the mifcarriage. The Eaftern fhenan may, at all events, be eafily procured in any quantity, at a very low price, by any captains of Turkey fhips, or other perfons, who may be at Aleppo, Smyrna, &c.

Meafure out two pints of this liquor; and put it into a flat earthen pan. When it is cool as new milk, take one fkin folded lengthwife, the grain fide outwards, and dip it in the liquor: rubbing the fame gently in with the hands. Then, taking out the fkin, hang it up to drain; and throw away the fuperfluous dye. Afterwards proceed in like manner with the remaining three fkins: repeating the fame operation, on each fkin feparately, eight times, before each frefh dipping; and fqueezing the fkins by drawing them through the hand. Lay them now on one fide of a large pan, fet floping to drain off as much of the moifture as will run from them without preffure, for about two hours, or till they be cold. Then tan them as here directed.

Article VI. Tanning the red fkins.

Powder four pounds of the beft white galls in a marble mortar; and fift them till the powder be fine. Mix them with about three quarts of water; and work the fkins well in this mixture for half an hour, or more: folding up the fkins fourfold. Let them lie in this tan twenty-four hours; when they are to be worked again as

as before; then taken out, ſcraped clean on both ſides from the firſt galls; and put into the like quantity of freſh galls and water. In this freſh mixture, they muſt be again well worked for three quarters of an hour; then folded up as before, and left in the freſh tan for three days. On the fourth day they muſt be taken out, waſhed clean from the galls, in ſeven or eight freſh quantities of water, and then hung up to dry.

Article VII. Manner of dreſſing the red ſkins after they are tanned.

When the ſkins have been treated as above, and are very near dry, they ſhould be ſcraped with the proper inſtrument, or ſcraper, on the fleſh ſide, to reduce them to a proper degree of thickneſs. Then they are to be laid on a ſmooth board, and glazed; by rubbing them with a ſmooth glaſs. After which they muſt be oiled, by rubbing them with olive oil, by means of a linen rag, in the proportion of one ounce and a half of oil to four ſkins: and then they are to be grained on a graining board lengthwiſe, breadthwiſe, and croſswiſe from corner to corner.

Article VIII. Preparation, with galls, of the ſkins for the yellow dye.

After the four ſkins are taken out of the drench of bran, and clean waſhed, as before directed, Article II, they muſt be very well worked, half an hour or more, in a mixture of one pound and a half of the beſt white galls, finely powdered, with two quarts of clean water. The ſkins are then to be ſeparately doubled lengthwiſe, rolled up with the fleſh ſide outwards, laid in the mixture, and cloſe preſſed down on each other: in which ſtate they muſt continue two whole days. On the third day, let them be again well worked in the tan; and afterwards ſcraped clean from the galls, with an ivory or braſs inſtrument (but no iron muſt touch them:) they muſt then be put into a freſh tan, made of two pounds of galls, with about three quarts of water; and well worked in it fifteen times. After this, they muſt be doubled, rolled up as before, and laid in the ſecond tan for two days. On the third day, a quarter of a pound of white ſea-ſalt muſt be worked into each ſkin: and the ſkins doubled rolled up as before; and returned into the tan till the day following: when they are to be taken out, and well waſhed ſix times in cold water, and four times in lukewarm. The water muſt be then well ſqueezed out, by laying the ſkins under preſſure for about half an hour, between two boards, with a weight of about two or three hundred pounds upon the uppermoſt board: when they will be ready for the dye.

Article IX. Preparation of the yellow dye in the proportion for four ſkins; and manner of application of it in dying the ſkins.

Mix ſix ounces of caſſiari gehira, or dgehira, or the berries of the Eaſtern rhamnus, with the ſame quantity of alum; and pound them together, till they be fine; in a marble or braſs mortar, with a braſs peſtle. Then, dividing the materials thus powdered into three equal parts, of four ounces each, put one of thoſe three parts into about a pint and a half of hot water, in a china or earthen veſſel; and ſtir the mixture together.

The caſſiari gehira is the berries of an Eaſtern rhamnus or buckthorn-tree; and may be obtained at Aleppo, or other parts of the Levant, at a ſmall price, by the ſame means as the ſhenan. The common Avignon berries, or yellow berries, may be ſubſtituted; but not with ſo good an effect, as the caſſiari gehira: which is a ſtronger and brighter yellow dye, as well for this uſe, as colouring paper hangings, and other purpoſes.

Let the boiled fluid ſtand to cool, till it will not ſcald the hand. Then ſpread one of the ſkins flat on a table in a warm room, with the grain ſide uppermoſt; and pour a fourth part of the tinging liquor, prepared as here directed, over the grain ſide, and ſpreading it equally over the ſkin with the flat of the hands, rub it well in. Afterwards do the like with the other three ſkins: for which the mixture firſt made will be ſufficient.

This operation muſt then be repeated twice more, ſeparately on each ſkin, with the remaining eight ounces of the powder of the berries and alum, with the above-mentioned due proportions of hot water, put to them as before directed.

The ſkins when dyed, are to be hung upon a wooden frame, without being folded, with the grain ſides outwards, about three quarters of an hour to drain: when they muſt be carried to a river, or ſtream of running water; and well waſhed in it ſix times or more. After this, they muſt be put under preſſure for about an hour, till the water be well ſqueezed out; and then hung up to dry in a warm room.

This being performed, the ſkins are to be dreſſed and grained as before directed for thoſe dyed red: except that they muſt not be oiled.

MORPHEW, *Morphæa*, among phyſicians, denotes a ſpecies of the leproſy ſituated in the ſkin only.

MORSELUS, *Morſulus*, in phyſick, denotes thoſe forms of medicine which are to be chewed in the mouth, as a lozenge or troche.

MORSUS *Diaboli*, in anatomy, is the fimbriated or jagged extremity of the fallopian tubes of the uterus.

Morſus Diaboli, devil's bit, in botany, a plant which ſeems to have a fringe around the bottom of its root, that appears as if bitten off at the bottom.

MORTALITY, is frequently applied to ſome contagious diſeaſe that deſtroys great numbers either of men or beaſts.

Bills of MORTALITY, weekly liſts compiled by the pariſh-clerks in and about London, that contain the numbers of ſuch as die of any diſeaſe, as well as of thoſe that are born every week. Theſe bills compriſe not only the ſuburbs and liberties of London and Weſtminſter, and borough of Southwark, but fifteen out-pariſhes next adjacent: only the chriſtenings and burials in the pariſh-churches; for, as to thoſe of the diſſenters, quakers, &c. they do not come under the cognizance of the pariſh clerks. The bills of mortality are of ſome ſtanding in England, in imitation whereof the like are now eſtabliſhed at Paris. They ſerve particularly to judge of the mortality of any diſeaſe, and whether an epidemick or infectious diſtemper increaſes or abates. There are alſo yearly bills collected out of the weekly ones, whereby it appears that the annual number of burials at London is 25 or 26000, at Paris, 17 or 18000.

MORTAR, *Morter*, in architecture, a compoſition of lime, ſand, &c. mixed up with water, that ſerves as a cement to bind the ſtones, &c. of any building. The ancients had a very hard kind of mortar, it being next to impoſſible to ſeparate ſome of their buildings; though ſome aſcribe that ſtrength to time, and the influence of the air. The antient lime is ſaid to have been burnt from the hardeſt ſtones, and even fragments of marble.

Worledge obſerves, that fine ſand makes weak mortar, and, the rounder the ſand, the ſtronger the mortar; he, therefore, adviſes the ſand to be waſhed before mixed; and adds that dirty water weakens the mortar conſiderably. The proportion of lime and ſand in our common mortar is extremely variable. Vitruvius preſcribes three parts of pit-ſand and two of river ſand to one of lime; but the ſand ſeems overdoſed. About London, the proportion of ſand to quick-lime is as 36 to 35. In ſome parts they uſe equal quantities of each.

White MORTAR, uſed for plaiſtering walls and ceilings, made of ox hair mixed with lime and water, without any ſand.

MORTAR *uſed in making of Water Courſes, Ciſterns*, &c. is made of lime and hog's lard, ſometimes mixed with the juice of figs, and ſometimes with liquid pitch which is firſt ſlaked with wine; and, after application, it is waſhed over with linſeed oil.

MORTAR *for Furnaces*, &c. is made with red clay, wrought in water, wherein horſe-dung and chimney ſoot have been ſteeped, by which a ſalt is communicated to the water that binds the clay, and makes it fit to endure the fire. This clay ought not to be too fat, leſt it ſhould be ſubject to chinks; nor too lean or ſandy, leſt it ſhould not bind enough.

MORTAR *uſed for the Inſide of refining Veſſels*, is made with quick-lime and ox-blood; the lime being firſt beaten to a powder, and ſifted, and afterwards mixed with the blood and beaten with a beater.

MORTAR *for Sun-dials on Walls*, may be made of lime and ſand tempered with linſeed oil. This ſpread upon the wall will become as hard as a ſtone, and not decay for many years.

Another tough MORTAR *for a Sun-dial Plane.* Take five or ſix gallons of brook-ſand, well dried, and, after that, ſifted through a fine ſplinted ſieve; then mix with

it

it ſomething more than the ſame quantity of ſifted lime, and a gallon of boring or gun-duſt ſifted alſo; temper all theſe well with ſix or ſeven gallons of ſkimmed milk, and about two quarts of linſeed oil. Lay this on the wall firſt well wetted with milk, and, keeping the matter often ſprinkled with milk, ſmooth it with the trowel. To prevent its cracking, mix hair with it, and, leſt it ſhould blow bliſters, prepare the lime as is done for freſco-painting.

MORTAR *for Floors*, *Walls*, *Cielings*, &c. Temper ox-blood and fine clay together, then lay the ſame in any floor, &c. and it will become a very ſtrong binding ſubſtance, ſaid to be much uſed in Italy. A good mortar for building is alſo made of two parts of waſte-ſoap-aſhes, one part of lime, one of lome, and one of ſand; or only lime and ſoap-aſhes tempered and wrought together. The aſhes ſhould be ground or ſtamped, before mixing with the ſand, or re-imbibed in water, to take off ſome of their acrimony.

MORTAR, *Mortarium*, in pharmacy, an inſtrument much uſed in the ſhops; it is uſually made of wood, marble, iron, braſs, lead or glaſs; but care muſt be taken not to uſe them indifferently.

MORTAR *Piece*, a ſhort piece of ordnance, thick and wide, proper for throwing bombs, carcaſſes, ſhells, ſtones, &c. It is uſually mounted on a carriage, whoſe wheels are very low, ſee (*plate* LXI. *fig.* 2.) For the path the bomb, &c. deſcribes, with the method of throwing a bomb to any diſtance, ſee PROJECTILE.

The following general rules ſhould always be obſerved in ſhooting in mortars:

1. In mortars, before you make a ſhot at any place, be ſure to find the diſtances thereof from your mortar.
2. That the bombs, or other bodies that are to be ſhot, be of equal weight; otherwiſe the ſhots will vary.
3. That the carriage in breadth be always on a level, and without any deſcent, that ſo it may not leap in diſcharging.
4. That the powder, with which the mortar is loaded, be always of the ſame force and weight.
5. That the charge of the mortar, as well in powder as in wadding, be always rammed in with blows equally heavy, and of equal number.
6. That the wads be always either of wood or tompions, or elſe of okam, for the ſtrongeſt drives it furtheſt.
7. That the fuſes be newly made, in thoſe days that they are to be uſed, and that they be made of a compoſition proportionable to the range that the ſhoot ſhall make in the air, ſo that the bomb may break in the very moment of its fall; which compoſition muſt be ſuch, that, though it fall in the water, yet not to extinguiſh, but the bomb there to break.

MORTGAGE, in law, an obligation, whereby lands or tenements of the debtor are pawned or bound over to the creditor for money or other effects borrowed; peremptorily to be the creditor's for ever, if the money be not repaid at a certain day agreed on.

MORTGAGE, in the common law, denotes the ſame with hypotheca in the civil law. The creditor holding ſuch land is called tenant in mortgage; he who lays the pawn is called the mortgager, and he that takes it the mortgagee. If a mortgage carry exceſſive uſury, it is prohibited by ſtat. 37 Hen. VIII.

MORTIER, a badge borne by the chancellors and great preſidents of the parliament of Paris: from hence called preſidents á mortier.

MORTIFICATION, *Necroſis*, in phyſick, a total extinction of the natural heat of the body, or ſome part thereof.

A mortification, in its firſt ſtage, is called a gangrene; but, when it is perfect or finiſhed, it is called a ſphacelus.

MORTMAIN, in law, the alienation of lands and tenements to any guild or corporation and their ſucceſſors, to biſhops, parſons, vicars, &c. which may not be done without the king's licence, and that of the lord of the manor; or of the king alone, if it be holden immediately of him. The preſidents and governors of hoſpitals may, without licence in mortmain, purchaſe land, &c. not exceeding the yearly value of 300l. ſtat. 14 Car. II.

MORTUARY, a gift left by a man at his death to his pariſh church, as a recompence of perſonal tithes and offerings not duly paid in his life-time.

MOSAICK, moſaick work, an aſſemblage of little bits of glaſs, marble, ſhells, precious ſtones, woods, &c. of various colours, cut ſquare, and cemented on a ground of ſtucco, &c. in imitation of the colours and degradations in painting.

MOSAICK *Work of Glaſs*. This kind they begin with little pieces of glaſs, which they provide of as many different colours as poſſible. To this end the glaſs-furnaces being diſpoſed, and the crucibles full of the glaſs-matter, they put what colour they think fit in each crucible, always beginning with the weakeſt, and augmenting the ſtrength of the colours from crucible to crucible, till they come to the deepeſt dye. The glaſs is taken out hot and laid on the ſmooth marble, flatting it down with another like marble, and then cutting it into ſlices of equal bigneſs, and an inch and a half thick. Then, with a peculiar inſtrument which the Italians call bocca di cane, they make ſome pieces ſquare, and others of different figures and ſizes; which are diſpoſed orderly in caſes.

If it be deſired to have gold, either in the ground, ornaments, or drapery, they take ſome of the pieces of glaſs: theſe they moiſten on one ſide with gum-water, and afterwards lay them over with gold-leaf; then putting the pieces on a fire-ſhovel, in the mouth of the furnace, after firſt covering them with another hollow piece of glaſs. Here they continue till they are red-hot, when the gold becomes ſo firmly cemented with the glaſs, that it will never afterwards quit it.

Out of theſe ſeveral pieces to form a picture, they firſt make a deſign, which they transfer on the ground or plaiſter by calking, as in freſco-painting. The plaiſter conſiſts of lime made of hard ſtone, with very fine brick duſt, gum tragacanth, and whites of eggs; when this plaiſter is prepared, and laid on the wall, and the deſign finiſhed, they take out with plyers the little pieces of glaſs, ranging them ſtrictly according to the light, ſhade, different teints and colours in the deſign, flatting them down with a ruler, which ſerves to ſink them within the ground, and to render the ſurface even. Thus after a long time, and with an infinite deal of trouble, they finiſh the work. Some of theſe are executed with ſo much juſtneſs, that they appear as ſmooth as a marble-table, and as maſterly as a painting in freſco.

The fineſt works of this kind, and thoſe whereon the moderns have retrieved the art, almoſt loſt, are thoſe of the church of St. Agnes, formerly the temple of Bacchus at Rome; beſides ſome at Piſa, Florence, &c. The moſt eſteemed among the works of the moderns are thoſe of Joſeph Pine, and the chevalier Lanfranck, in the church of St. Peter at Rome. There are very good ones likewiſe at Venice.

MOSAICK *Work of Marble and precious Stone*. Moſaick of marble is uſed in large works, as in pavements of churches, &c. and in the incruſtation and veneering of the walls thereof. As to that of precious ſtones, it is only uſed in ſmall works. The ground of moſaick wholly marble is a maſſive of either white or black marble. On this ground the deſign is cut with a chiſſel, having been firſt calked. When it is dug of a ſufficient depth, an inch or more, it is filled up with marble of a proper colour, firſt faſhioned to the deſign, and reduced to the thickneſs of the cavities with various inſtruments. To make the pieces hold, they uſe a ſtucco compoſed of lime and marble duſt, or a maſtick; after which the work is half poliſhed with a ſoft kind of ſtone.

When the figures are thus marked, the ſculptor draws with a pencil the colours of the figures not determined by the ground, and in the ſame manner makes etchings, in the place where ſhadows are to be; and, when he has engraved all the ſtrokes with the chiſſel, he fills them up with a black maſtick compoſed partly of Burgundy pitch, poured on hot; taking off afterwards what is ſuperfluous with a piece of ſoft ſtone or brick, which with water and beaten cement takes away the maſtick, poliſhes the marble, and renders the whole ſurprizingly even. This kind of moſaick we ſee in the church of the invalids at Paris, and the fine chapel at Verſailles, and wherewith ſome entire apartments of that place are incruſtated.

The marble and ſtones are ſawn into the thinneſt leaves imaginable, ſcarce exceeding half a line in thickneſs. The block to be ſawed is faſtened with cords on the bench, only raiſed a little on a piece of wood, one or two inches high. Two iron pins which are on one ſide of

of the block, and which ſerve to faſten it, ſerve alſo to direct the ſaw. The pieces to be ſawed are put into a viſe contrived for the purpoſe: in which ſtate, with a kind of ſaw or bow made of fine braſs wire, bent on a piece of ſpringy wood, together with emery ſteeped in water, the leaf is gradually faſhioned, by following the ſtrokes of the deſign made on paper and glued on the piece. When there are pieces enough faſhioned, they are applied: the ground that ſuſtains this moſaick is uſually of free-ſtone. The matter, wherewith the ſtones are joined together, is a maſtick, or ſtucco, laid very thin on the leaves, as they are faſhioned, and ſo applied with plyers. If any contour, &c. of a leaf be not either rounded or ſquared enough, it is brought down with a braſs file or raſp; and, when too ſmall, it is managed with a drill and other lapidary inſtruments.

Mosaick *of Gypſum*, a kind of coarſe talck, or tranſparent ſtone, found in the quarries of Montmartre near Paris, among the ſtones thence dug to make the plaiſter of Paris. Of this gypſum, calcined in a kiln, beaten in a mortar and ſifted, they make an artificial marble, imitating precious ſtones, and of theſe compoſe a kind of moſaick little ſhort of the durableneſs and vivacity of the natural ſtones, and which farther admits of continued pieces without any joining viſible. The ground is either of plaiſter of Paris or free-ſtone: if the former, it is ſpread in a wooden frame, of the length and breadth of the intended work, and about an inch and a half thick This frame is ſo contrived, that it may be diſmounted, when the plaiſter is dry. This frame is covered with a ſtrong linen cloth, nailed on at bottom all round, and, being placed horizontally, it is filled with plaiſter paſt through a wide ſieve. When the plaiſter is half dry, the frame is ſet perpendicular, till it be thoroughly dry. In this moſaick the ground is the moſt important part. The ſifted gypſum to be applied on this ground is diſſolved and boiled in the beſt Engliſh glue, and, after mixing with it the colour it is to bear, the whole is worked up together into the ordinary conſiſtence, and then ſpread on the ground five or ſix inches thick. If mouldings be required, they are formed with gouges, &c.

On this plaiſter the deſign is drawn, having been firſt pounced or calked. To impreſs the deſign, they uſe the ſame inſtruments with the ſculptors, the ground being not much leſs hard than marble. The cavities thus made are filled up with the ſame gypſum boiled in glue, only differently coloured. The neceſſary teints and colours are ready at hand in little pots. When the deſign is thus filled, by half poliſhing it with brick or ſoft ſtone, they go over it again, cutting ſuch places as are to be weaker or more ſhadowed, and filling them with gypſum which is repeated till all the colours repreſent the original to the life. When the work is finiſhed, it is ſcoured with ſoft ſtone, ſand, and water, then with pumice ſtone, and, laſtly, poliſhed with a wooden rubber and emery. A luſtre is given it by ſmearing it over with oil, and rubbing it ſome time with the palm of the hand. As to moſaick work of wood, more properly called marquetry or inlaid work, ſee Marquetry.

MOSQUE, *Moſk*, a temple, among the Mahometans, for the exerciſes of their religion.

MOSS, Moscus, in natural hiſtory, a little plant of the paraſite kind, growing on the barks, &c. of ſeveral trees. Botanick writers enumerate a great number of moſſes: the chief of which are the hairy tree moſs and ſea moſs; the former conſiſts of a great number of long, ſlender, hoary ſtrings, ſomewhat tough and hard, hanging down ſome way from the branches of the trees they grow on, which are uſually old oaks. The ſea moſs is a ſlender capillary plant, without a foot-ſtalk, and found in the Adriatick ſea.

Moſs is frequently very injurious to fruit-trees, growing on cold barren ſoils, or where they are ſo cloſely planted as to exclude the free acceſs of the air; the only remedy, in ſuch caſes, is to cut down part of the trees, and to plough up the ground between thoſe left remaining: and in the ſpring-ſeaſon, in moiſt weather, you ſhould, with an iron inſtrument made a little hollow, the better to ſurround the branches of the trees, ſcrape off the moſs, carrying it off the place; and by two or three times thus cleanſing them, together with carefully ſtirring the ground, it may be entirely deſtroyed from the trees; but unleſs part of the trees were cut down, and the ground be well ſtirred, the rubbing off the moſs will ſignify little. If the trees are covered with moſs, on account of the dryneſs of the ground, the proper remedy is to lay mud, from the bottom of a river, pretty thick about their roots.

Moss, a name given to boggy grounds in many parts of England. Theſe conſiſt of a turfy ſurface, below which is a black, moiſt, ſpongy earth, which being dug up with ſpades, ſomewhat in the form of bricks, and dried, is what they call peats, uſed as fuel in ſeveral parts, and the upper ſcurf being cut and dried, makes turfs, another coarſer ſort of fuel.

MOSTRA, in the Italian muſick, a mark at the end of a line or ſpace, to ſhew that the firſt note of the next line is in that place; and if this note be accompanied with a ſharp or flat, it is proper to place theſe characters along with the moſtra.

MOTAZALITES, the name of a famous ſect among the Mahometans, properly ſignifying ſeparatiſts. The Motazalites are not accounted orthodox muſſulmen, as they believe the alkoran to be created and not eternal; and beſides aſſert, that there are no attributes in God diſtinct from his eſſence.

MOTE, in law-books, ſignifies court or convention, as a ward-mote, burgh-mote, ſwain-mote, &c. See Ward-Mote, &c.

MOTETTO, in the Italian muſick, a ſort of church-muſick, compoſed with much art and ingenuity, from one to eight parts, with or without inſtruments, and uſually accompanied with a thorough baſs.

MOTION, is defined to be the continued and ſucceſſive change of place.

There are three general laws of motion. 1. That a body always perſeveres in its ſtate of reſt, or of uniform motion in a right line, till by ſome external force it be made to change its ſtate: for as body is paſſive in receiving its motion, and the direction of its motion, ſo it retains them, or perſeveres in them without any change, till it be acted on by ſomething external. From this law it appears, why we inquire not, in philoſophy, concerning the cauſe of the continuation of motion or reſt in bodies, which can be no other than their inertia: but if a motion begin, or if a motion already produced is either accelerated or retarded, or if the direction of the motion is altered, an inquiry into the power or cauſe that produces this change is a proper ſubject of philoſophy. 2. The ſecond general law of motion is, that the change of motion is proportional to the force impreſſed, and is produced in the right line in which that force acts. When a fluid acts upon a body, as water or air upon the vanes of a mill, or wind upon the ſails of a ſhip, the acceleration of the motion is not proportional to the whole force of thoſe fluids, but to that part only which is impreſſed upon the vanes or ſails, which depends upon the exceſs of the velocity of the fluid above the velocity which the vane or ſail has already acquired; for if the velocity of the fluid be only equal to that of the vane or ſail, it juſt keeps up with it, but has no effect either to advance or retard its motion. Regard muſt always be had to the direction in which the force is impreſſed, in order to determine the change of motion produced by it: thus, when the wind acts obliquely with reſpect to the direction of a ſhip, the change of her motion is firſt to be eſtimated in the direction of the force impreſſed; and thence, by a proper application of mechanical and geometrical principles, the change of the motion of the ſhip in her own direction is to be deduced. 3. The third general law of motion is, that action and reaction are equal, with oppoſite directions, and are to be eſtimated always in the ſame right line. Body not only never changes its ſtate of itſelf, but reſiſts by its inertia every action that produces a change in its motion: hence when two bodies meet, each endeavours to perſevere in its ſtate, and reſiſts any change; the one acquires no new motion, but what the other loſes in the ſame direction; nor does this laſt loſe any force, but what the other acquires; and hence, though by their colliſion, motion paſſes from the one to the other, yet the ſum of their motions, eſtimated in a given direction, is preſerved the ſame, and is unalterable by their mutual actions upon each other.

All motion may be conſidered abſolutely or relatively. Abſolute or real motion, ſays Mr. Maclaurin, is when a body

a body changes its place in abfolute fpace; and relative motion, is when a body changes its place only with relation to other bodies.

From the obfervation of nature, every one knows that there is motion: that a body in motion perfeveres in that ftate, till by the action of fome power it is neceffitated to change it; that it is not in relative or apparent motion in which it perfeveres, in confequence of its inertia, but in real or abfolute motion. Thus the apparent diurnal motion of the fun and ftars would ceafe, without the leaft power or force acting upon them, if the motion of the earth was ftopped; and if the apparent motion of any ftar was deftroyed by a contrary motion impreffed upon it, the other celeftial bodies would ftill appear to perfevere in their courfe. See INERTIA.

To make this matter ftill plainer, Mr. Martin obferves, that fpace is nothing but an abfolute and infinite void, and that the place of a body is that part of the immenfe void which it takes up or poffeffes: and this place may be confidered abfolutely, or in itfelf, in which cafe it is called the abfolute place of the body; or elfe with regard to the place of fome other body, and then it is called the relative or apparent place of the body.

Now as a motion is only the change of place in bodies, it is evident that it will come under the fame diftinction of abfolute and relative or apparent. All motion is in itfelf abfolute, or the change of abfolute fpace; but, when the motions of bodies are confidered and compared with each other, then are they relative and apparent only: they are relative, as they are compared to each other; and they are apparent only, infomuch that not their true or abfolute motion, but the fum or difference of the motions only is perceivable to us.

In comparing the motion of bodies, we may confider them as moving both the fame way, or towards contrary parts: in the firft cafe, the difference of motion is only perceived by us; in the latter, the fum of the motions. Thus, for example, fuppofe two fhips, A and B, fet fail from the fame port upon the fame rhumb, and that A fails at the rate of five miles per hour, and B at the rate of three: here the difference of the velocity (viz. two miles per hour) is that by which the fhip A will appear to go from the fhip B forwards, or the fhip B will appear at A to go with the fame velocity backwards, to a fpectator in either refpectively.

If the two fhips, A and B, move with the fame degree of velocity, then will the difference be nothing, and fo neither fhip will appear to the other to move at all. Hence it is, that though the earth is continually revolving about its axis, yet, as all objects on its furface partake of the fame common motion, they appear not to move at all, but are relatively at reft.

If two fhips, A and B, with the degrees of velocity as above, meet each other, the one will appear to the other to move with the fum of both velocities, viz. at the rate of eight miles per hour; fo that in this cafe the apparent motion exceeds the true, as in the other it fell fhort of it. Hence the reafon why a perfon, riding againft the wind, finds the force of it much greater than it really is; whereas, if he rides with it, he finds it lefs.

The reafon of all thefe phænomena of motion will be evident, if we confider we muft be abfolutely at reft, if we would difcern the true or real motions of bodies about us. Thus a perfon on the ftrand will obferve the fhips failing with their real velocity; a perfon ftanding ftill will experience the true ftrength and velocity of the wind; and a perfon, placed in the regions between the planets, will view all their true motions, which he cannot otherwife do, becaufe in all other cafes the fpectator's own motion muft be added to or fubtracted from that of the moving body, and the fum or difference is therefore the apparent or relative motion, and not the true.

Motion is alfo either equable or accelerated.

Equable motion is that by which a body paffes over equal fpaces in equal times.

Accelerated motion is that which is continually augmented or increafed, as retarded motion is that which continually decreafes; and, if the increafe or decreafe of motion be equal in equal times, the motion is then faid to be equally accelerated or retarded.

Equable motion is generated by a fingle impetus or ftroke; thus the motion of a ball from a cannon is produced by the fingle action of the powder in the firft moment, and, therefore, the velocity it firft fets out with, would always continue the fame, were it void of gravity, and to move in an unrefifting medium; which, therefore, would be always equable, or fuch as would carry it through the fame length of fpace in every equal part of time.

Animal MOTION, is that whereby the fituation, figure, magnitude, &c. of the parts, &c. of animals are changed: under thefe are comprifed all the animal functions. See FUNCTION. Animal motions are divided into fpontaneous and natural.

Spontaneous or *mufcular* MOTION, is that performed by the mufcles at the command of the will. See MUSCLE.

Natural or *involuntary* MOTION, that effected, without any fuch command, by the mere mechanifm of the parts, fuch as the motion of the heart, pulfe, &c.

Inteftine MOTION, the agitation of the particles of which a body confifts. Some philofophers will have every body, and every particle thereof, in continual motion. Hence inteftine motion is reprefented to be a motion of the internal and fmaller parts of matter, continually excited by fome external latent agent, which only difcovers itfelf by effects, being appointed by nature as the great inftrument of the changes in bodies.

MOTION, in aftronomy, peculiarly denotes the orderly courfes of the heavenly bodies. The motions of the celeftial luminaries are diurnal or common, and fecondary or proper.

Diurnal or *primary* MOTION, is that wherein the whole mundane fphere appears to revolve every day round the earth from eaft to weft. See DIURNAL. This is called the motion of the primum mobile, and the common motion, to diftinguifh it from that peculiar to each planet, &c.

Secondary or *proper* MOTION, is that wherewith a ftar, planet, &c. advances a certain fpace every day from weft towards eaft.

MOTTO, in armoury, a fhort fentence or phrafe carried in a fcroll, generally under, but fometimes over the arms; fometimes alluding to the bearing, fometimes to the name of the bearer, and fometimes containing whatever pleafes the fancy of the devifer.

MOVEABLE, in general, denotes any thing capable of being moved. The moveable feafts are fuch as are not regularly held on the fame day of the year or month, though they are always on the fame day of the week. The moveable terms are Eafter-term and Trinity-term.

MOVEABLE *Goods*, in law, fuch chattels as are capable of being removed from one place to another, as cattle, merchandize, &c.

MOVEMENT, in mechanicks, a machine moved by clock-work. To make a regular movement, that may ferve to meafure time as exactly as poffible, is one of the moft valuable problems in mechanicks, which has been moft fuccefsfully effected hitherto by adapting pendulums to clocks: though it muft be owned, that many ingenious contrivances have been invented to correct the irregularities of thofe movements that go by fprings.

MOULD, or MOLD, in the mechanick arts, &c. a cavity cut with a defign to give its form or impreffion to fome fofter matter applied therein, of great ufe in fculpture, foundery, &c.

MOULDS, in the manufacture of paper, are little frames compofed of feveral brafs or iron wires, faftened together by another wire ftill finer. Each mould is of the bignefs of the fheet of paper to be made, and has a rim or ledge of wood to which the wires are faftened; thefe moulds are more ufually called frames, or forms.

Furnace or *Crucible-makers* MOULDS are made of wood, of the fame form with the crucibles; that is, in form of a truncated cone: they have handles of wood to hold and turn them with, when, being covered with the earth, the workman has a mind to round or flatten his veffel.

MOULDS *for Leaden Bullets*, are little iron pincers, each of whofe branches terminates in an hemifpherical concavity, which, when fhut, form an entire fphere: in the lips or fides where the branches meet, is a little jet or hole, through which the melted lead is conveyed.

Glaziers-MOULDS. The glaziers have two kinds of moulds, both ferving to caft their lead. In the one they caft the lead into long rods or canes, fit to be drawn through

through the vice, and the grooves formed therein: this they sometimes call ingot-mould. In the other they mould those little pieces of lead a line thick, and two lines broad; fastened to the iron bars: these may be also cast in the vice.

Goldsmiths-MOULD. The goldsmiths use the bones of the cuttle-fish to make moulds for their small works, which they do by pressing the pattern between two bones, and leaving a jet or hole to convey the silver through, after the pattern has been taken out.

MOULD, among masons, a piece of hard wood or iron hollowed withinside, answering to the contours of the mouldings or corniches, &c. to be framed; this is otherwise called caliber.

MOULDS, among plumbers, are the tables whereon they cast the sheets of lead. See PLUMBERY.

MOULDS, among tallow-chandlers, are of two kinds: the first for the common dipped candles, being the vessel wherein the melted tallow is disposed, and the wick dipped: this is of wood, of a triangular form, and supported on one of its angles, so that it has an opening of near a foot at top: the other, used in the fabrick of mould candles, is of brass, pewter, or tin; here each candle has its distinct mould.

MOULD, among gold-beaters, a certain number of leaves of vellum, or pieces of guts, cut square, of a certain size, and laid over one another, between which they put the leaves of gold and silver, which they beat on the marble with the hammer.

MOULD, in agriculture, a loose kind of earth, every where obvious on the surface of the ground, called also natural or mother-earth; by some also loam.

MOULDINESS, a term applied to bodies which corrupt in the air, from some hidden principle of humidity therein; and whose corruption shews itself by a certain white down, or lanugo, on their surface, which, viewed through a microscope, appears like a kind of meadow, out of which arise herbs and flowers, some only in the bud, others full blown, and others decayed, each having its root, stalk, and other parts.

MOULDING, any thing cast in a mould, or that seems to have been so, though in reality it were cut with a chissel or the ax.

MOULDING, in architecture, projectures beyond the naked wall, column, wainscot, &c. the assemblage of which forms corniches, door-cases, and other decorations of architecture.

MOULDING, in ship-building, the juttings or projectures beyond the level of the side; they are placed above one another; the intervals of which are generally ornamented with martial instruments, trophies of war, marine and other emblematical figures, &c.

MOULINET, in mechanicks, is used to signify a roller, which being crossed with two levers, is usually applied to cranes, capstans, and other sorts of engines of the like nature, to draw ropes, and heave up stones, &c.

MOULINET is also a kind of turnstile, or wooden cross, which turns horizontally upon a stake fixed in the ground; usually placed in passages to keep out horses, and to oblige passengers to go and come one by one. These moulinets are often set near the outworks of fortified places, at the sides of the barriers, through which people pass on foot.

MOUND, a term used for a bank or rampart, or other fence, particularly that of earth.

MOUND, in heraldry, a ball or globe with a cross upon it, such as our kings are usually drawn with, holding it in their left hands, as they do the sceptre in the right.

MOUNT-EGG, in the tin-works. After the tin from the burnt ore is melted down and re-melted, there will sometimes remain a different slug in the bottom of the float; this they call mount-egg; and though of a tin colour, yet is of an iron nature, as has been found by applying a magnet to it.

MOUNTAIN, *Mons*, a part of the earth, rising to a considerable height above the level of the surface thereof.

Burning-MOUNTAIN. See VOLCANO.

MOUNTING, in the mechanick arts, something that serves to raise or set off a work: thus, the frame and its dependences make the mounting of a looking-glass; the hilt, the mounting of a sword; the fust, or but, the mounting of a carabine, musquet, &c. and the mounting of a fan, is the sticks which serve to open and shut it.

MOUNTING, in military affairs, signifies going upon duty: thus, mounting a breach, is running up to it; mounting the guard, is going upon guard; and mounting the trenches, is going upon duty in the trenches: but mounting a cannon, mortar, &c. is the setting it on its carriage, or the raising its mouth.

MOUSE, among sailors, a sort of rising made on the stays, and some other ropes, in a ship, to prevent the eye, in one end of the rope, from slipping up above its proper place, or the body of it. The mouse, which somewhat resembles a pear, is raised by winding tarred canvas, called parsling, about the stay in one place, and afterwards a great many turns of spun-yarn: the whole is completed by weaving a coat or cover around the mouse very curiously, which is called pointing.

MOUTH, in anatomy, a part of the face, consisting of the lips, the gums, the insides of the cheeks, the palate, the salival glands, the os hyoides, the uvula, and the tonsils; which see under their proper articles.

MOXA, a sort of cotton or downy substance, separated from the leaves of a sort of Indian mugwort; used by the eastern nations for cauterizing in certain parts of the body.

MUCILAGE, in pharmacy, is in general any viscid and glutinous liquor.

MUCILAGE also denotes a thick pituitous matter, evacuated with the urine, in the gravel and dysuria.

MUCILAGE likewise imports the liquor which principally serves to moisten the ligaments and cartilages of the articulations.

MUCILAGINOUS GLANDS, in anatomy, a very numerous set of glands, serving to secrete the mucilage of the joints.

MUCOR, in botany, a genus of funguses consisting of little roundish bladders, in which are found numerous seeds affixed to hair-like receptacles, placed all over the inside of the bladders.

MUCOUS GLANDS, in anatomy, three glands which empty themselves into the urethra; so called by their first discoverer, Mr. Cowper, from the tenacity of the liquor which they separate.

MUCRO CORDIS, in anatomy, the lower or pointed end of the heart.

MUCUS, a mucilaginous liquor, separated by the mucous glands and the nostrils.

MUFFLE, in metallurgy, an arched cover, resisting the strongest fire, and made to be placed over coppels and tests, in the operations of assaying, to preserve them from the falling of coals and ashes into them; though, at the same time of such a form, as is no hindrance to the action of the air and fire on the metal, nor to the inspection of the assayer. The muffles may be made of any form, providing they have these conditions: but those used with coppels are commonly made semi-cylindrical; or when greater vessels are employed, in form of a hollow hemisphere. The muffle must have holes, that the assayer may look in; and the forepart of it must be always quite open, that the air may act better in conjunction with the fire, and be incessantly renewed: the apertures in the muffle serve also for the regimen of the fire, for the cold air rushing into the large opening before, cools the bodies in the vessel; but if some coals are put in it, and its aperture before be then shut, with a door fitted to it, the fire will be increased to the highest degree, much more quickly than it can be by the breathing holes of the furnace.

MUFTI, or MUPHTI, the chief of the ecclesiastical order, or primate of the mussulman religion.

MUGGLETONIANS, a religious sect, which arose in England about the year 1657; so denominated from their leader, Lodowick Muggleton, a journeyman taylor, who, with his associate Reeves, set up for great prophets; pretending, as it is said, to have an absolute power of saving and damning whom they pleased; and giving out, that they were the two last witnesses of God, that should appear before the end of the world.

MUGWORT, *Artemisia*, in botany. See ARTEMISIA.

MULBERRY-TREE, *Morus*, in botany, a genus of plants of the monoecia-triandria class; the male flowers are collected in a long amentum, having no corolla: the stamina are four erect subulated filaments, longer than the cup, and terminated with simple antheræ: the

female flowers have no petals; they are collected in round heads, and are succeeded by a well-known, large, fleshy, succulent berry, composed of several protuberances, in each of which is placed an oval pointed seed. Of mulberries, there are two kinds, the black and the white; but the black is most common with us. They are propagated by sowing the seeds, or by laying down the fruit-bearing branches; but those propagated by seeds are commonly most vigorous, though they seldom prove so fruitful as the others. They may also be increased from cuttings planted in March. The soil mulberry-trees delight in, is a rich light earth, of a good depth; they should never be planted near other trees or buildings, for then the fruit will not ripen so well. Mulberries have the qualities common to other sweet fruits, in abating heat and quenching thirst; they are chiefly eaten for pleasure, but they yield little nourishment. The leaves of this plant are used in France, Italy, Persia, &c. for feeding silk-worms; for which purpose, they should never be allowed to grow tall, but kept in a sort of hedge; and instead of pulling off the leaves singly, they should be cut off with sheers, together with the young branches.

MULCT, a fine of money laid upon a man who has committed some fault or misdemeanour.

MULCH, a term used by gardeners for rotten dung, or the like, thrown upon beds of young plants, to preserve them from the bad effects of cold or drought.

MULE, in zoology, a mongrel kind of quadruped, usually generated between an ass and a mare, and sometimes between a horse and a she-ass. The mule is a sort of a monster, of a middle nature between its parents, and therefore incapable of propagating its species; so careful is nature to avoid filling the world with monsters. Mules are chiefly used in countries where there are rocky and stony roads, as about the Alps, Pyrenees, &c.

MULLER, or MULLAR, denotes a stone flat and even at the bottom, but round at top, used for grinding matters on a marble. The apothecaries use mullers to prepare some of their testaceous powders, and painters for their colours, either dry or in oil.

MULLER is also an instrument used by the glass-grinders; being a piece of wood, to one end whereof is cemented the glass to be ground: it is ordinarily about six inches long turned round.

MULLET, *Mugil*, in ichthyology, a genus of fishes resembling salmon, but much smaller.

MULLET, or MOLLET, in heraldry, a bearing in form of a star, or rather of the rowel of a spur, which it originally represented. The mullet has but five points; when there are six, it is called a star; though others make this difference, that the mullet is, or ought to be, always pierced, which a star is not. The mullet is usually the difference or distinguishing mark for the fourth son, or third brother, or house; though it is often borne alone, as coat-armour.

MULTANGULAR, a figure, or body, which has many angles.

MULTILATERAL, in geometry, is applied to those figures which have more than four sides or angles, more usually called polygons. See POLYGON.

MULTINOMIAL, or MULTINOMIAL ROOTS, in mathematicks, such roots as are composed of many names, parts, or members; as $a+b+d+c$, &c.

MULTIPLE, *Multiplex*, in arithmetick, a number which comprehends some other several times; thus 6 is a multiple of 2, and 12 is a multiple of 6, 4, and 3, comprehending the first twice, the second thrice, &c.

MULTIPLE RATIO, or PROPORTION, is that which is between multiples. If the less term of the ratio be an aliquot part of the greater, the ratio of the greater to the less is called multiple; and that of the less to the greater submultiple. A submultiple number is that contained in the multiple; thus the numbers 1, 2, and 3, are submultiples of 6. Duple, triple, &c. ratios, as also subduples, subtriples, &c. are so many species of multiple and submultiple ratios.

MULTIPLICAND, in arithmetick, one of the factors in the rule of multiplication; being that number which is given to be multiplied by another, which is called the multiplicator, or multiplier.

MULTIPLICATION, which is the fourth rule in arithmetick, is the taking or repeating of the multiplicand, as often as the multiplier contains unity. Or, multiplication, from a multiplicand and a multiplier given, finds a third number, called the product, which contains the multiplicand as often as the multiplier contains unity. See ARITHMETICK.

Hence multiplication supplies the place of many additions; for if the multiplicand be repeated or set down as often as there are units in the multiplier, the sum of these, taken by addition, will be equal to the product by multiplication. Thus, $5\times3=15=5+5+5$.

Case I. To multiply single numbers by one another.

The first and lowest step in multiplication is, to multiply one digit by another; and the fact or number thence arising is called a single product. This elementary step may be learned from the following table, commonly called Pythagoras's table of multiplication: which is consulted thus; seek one of the digits or numbers on the head, and the other on the left side, and in the angle of meeting you have their product. The learner, before he proceed further, ought to get the table by heart.

To Pythagoras's table are here added, on account of their usefulness, the products of the numbers 10, 11, 12.

T A B L E.

1	2	3	4	5	6	7	8	9	10	11	12
2	4	6	8	10	12	14	16	18	20	22	24
3	6	9	12	15	18	21	24	27	30	33	36
4	8	12	16	20	24	28	32	36	40	44	48
5	10	15	20	25	30	35	40	45	50	55	60
6	12	18	24	30	36	42	48	54	60	66	72
7	14	21	28	35	42	49	56	63	70	77	84
8	16	24	32	40	48	56	64	72	80	88	96
9	18	27	36	45	54	63	72	81	90	99	108
10	20	30	40	50	60	70	80	90	100	110	120
11	22	33	44	55	66	77	88	99	110	121	132
12	24	36	48	60	72	84	96	108	120	132	144

Case II: To multiply a compound number by a single one.

Rule. Having placed the multiplier under the unit's place of the multiplicand; first, multiply the unit of the multiplicand by the multiplier; if their product be less than 10, set it down underneath its own place of units, and proceed to the next figure of the multiplicand: but if their product be above 10, or tens, then set down the overplus only, or odd figure, as in addition, and carry the said 10 or tens in mind, till you have multiplied the next figure of the multiplicand with the multiplier: then, to their product add the 10 or tens carried, setting down the overplus of their sum above the tens, as before; and so proceed in that manner till all the figures of the multiplicand are multiplied with the multiplier.

Example. Suppose it were required to multiply 3213 by 3.

3213 Multiplicand.
   3 Multiplier.
――――
9639

For, beginning at the unit's place 3, say, 3 times 3 is 9, which, because it is less than 10, set down underneath its own place, and proceed to the next place of tens, saying, 3 times 1 is 3, which set down underneath its own place; then at the next place, viz. of hundreds, say, 3 times 2 is 6, which set down as before; lastly, at the place of thousands, say, 3 times 3 is 9, which being set down underneath its own place, the operation is finished, and the true product is 9639.

Case III. To multiply one compound number by another.

Rule. Place every number respectively under its own kind; multiply each figure of the multiplicand by each figure of the multiplier, as before; and observe to set the first figure of each respective product under that figure of the multiplier, by which it was made; lastly, add the several products together for the whole product.

Example

Example I. Let it be required to multiply 78094 into or with 7563.

78094 } 7563 }	factors.
234282	the firſt particular product with 3
468564	the ſecond ———— with 60
390470	the third ———— with 500
546658	the fourth ———— with 7000
590624922	the total of the true product required.

Example II. Suppoſe it required to multiply 57498 into 60008.

57498	
60008	
459984	the product with 8
344988	the product with 6000
3450339984=57498×60008.	

When there is a cypher or cyphers, to the right hand either to the multiplicand or multiplier, or to both, in that caſe multiply the figures as before; neglecting the cyphers until the particular products are added together; then to the ſum annex ſo many cyphers as are in either or both the factors.

Multiplication *of mixed Numbers.* Begin at the loweſt ſpecies of the multiplicand, and, having multiplied that number, reduce the product to the next ſpecies; that is, find how many units of the next ſuperior ſpecies it is equal to, and what remains over; ſet what is over as a part of the anſwer of the denomination multiplied. Then multiply the given number of the next ſuperior ſpecies, and to the product add that number to which the product of the preceding ſpecies was reduced; and reduce this ſum to the next ſuperior ſpecies; making the remainder, or what is over, as part of the anſwer of the ſpecies multiplied; and proceed in this manner through all the ſpecies of the multiplicand.

For example. Let it be required to multiply 68*l.* 14*s.* 9*d.*$\frac{3}{4}$ by 7. The work will ſtand as follows.

l.	*s.*	*d.*
68 :	14 :	9$\frac{3}{4}$
		7
481 :	03 :	08$\frac{1}{4}$

Here ſay, 3×7=21; which is 1 farthing over 5 pence; therefore ſet down 1, and carry 5 to the next ſpecies, viz. that of pence. Then 7×9=63, and the 5 pence carried make 68 pence, or 5 ſhillings and 8 pence; therefore ſet down 8 pence, and carry 5 to the next ſpecies or that of ſhillings. Then 7×14=98 ſhillings, and the 5 carried make 103 ſhillings, or 5 pounds 3 ſhillings; therefore ſet down 3 ſhillings, and carry 5 to the place of pounds. Then multiply the 68 pounds by 7, and add the 5 carried, and the whole product will be 481*l.* 3*s.* 8*d.* $\frac{1}{4}$. Note, when the multiplicator is large, it will be eaſieſt to divide it into two or more parts, ſo that thoſe multiplied together may produce the given multiplicator. Thus, if the multiplicator were 28, it may be reſolved into 7 and 4, becauſe 4×7=28. Therefore multiply the given multiplicand by 7, and that product by 4, and the laſt product will give the anſwer required.

Croſs Multiplication, otherwiſe called duodecimal arithmetick, is an expeditious method of multiplying things of ſeveral ſpecies, or denominations, by others alſo of different ſpecies, &c. As feet and inches by feet and inches, &c. This method is much uſed in practical meaſuring, and is performed in the following manner: Suppoſe it were required to multiply 5 feet 3 inches, by 2 feet 4 inches. Having placed them under each other, ſay, 2 times 5 feet is 10 feet, and 2 times 3 inches is 6 inches, which ſet down under the line: again, 4 times 5 is 20 inches, or 1 foot 8 inches, which place under the former: Alſo 4 times 3 is 12 parts or one inch, which ſet down in the row of inches, and add theſe ſums together, which will give 12 feet 3 inches, the product or content required.

F.	*I.*
5 :	3
2 :	4
10 :	6
1 :	8
	1
12 :	3

Multiplication *of Algebra.* In multiplication the general rule for the ſigns is, that when the ſigns of the factors are alike (*i. e.* both + or both −) the ſign of the product is +; but when the ſigns of the factors are unlike, the ſign of the product is −.

Caſe 1. When any poſitive quantity, $+a$, is multiplied by any poſitive number, $+n$, the meaning is, that $+a$ is to be taken as many times as there are units in n; and the product is evidently na.

Caſe 2. When $-a$ is multiplied by n, then $-a$ is to be taken as often as there are units in n; and the product muſt be $-na$.

Caſe 3. Multiplication by a poſitive number implies a repeated addition: but multiplication by a negative implies a repeated ſubtraction. And, when $+a$ is to be multiplied by $-n$, the meaning is that $+a$ is to be ſubtracted as often as there are units in n; therefore the product is negative, being $-na$.

Caſe 4. When $-a$ is to be multiplied by $-n$, then $-a$ is to be ſubtracted as often as there are units in n; but to ſubtract $-a$ is equivalent to adding $+a$, conſequently the product is $+na$. The ſecond and fourth caſes may be illuſtrated in the following manner:

It is evident that $+a-a=0$; therefore if we multiply $+a-a$ by n, the product muſt vaniſh or be 0, becauſe the factor $a-a$ is 0. The firſt term of the product is $+na$ (by caſe 1.) Therefore, the ſecond term of the product muſt be $-na$, which deſtroys $+na$; ſo that the whole product muſt be $+na-na=0$. Therefore, $-a$ multiplied by $+n$, gives $-na$.

In the like manner, if we multiply $+a-a$ by $-n$, the firſt term of the product being $-na$, the latter term of the product muſt be $+na$, becauſe the two together muſt deſtroy each other, or their amount 0, ſince one of the factors (viz. $a-a$) is 0. Therefore, $-a$ multiplied by $-n$ muſt give $+na$.

If the quantities to be multiplied are ſimple, find the ſign of the product by the laſt rule; after it place the product of the co-efficients, and ſet down all the letters after one another, as before.

Examples.

Mult.	$+a$	$-2a$	$+6x$
By	$+b$	$+4b$	$-5a$
Product	$+ab$	$-8ab$	$-30ax$

Mult.	$-8x$	$+3ab$
By	$-4a$	$-5ac$
Product	$+32ax$	$-15aabc$

To multiply compound quantities, you muſt multiply every part of the multiplicand by all the parts of the multiplier taken one after another, and then collect all the products into one ſum, which will be the product deſired.

$$\begin{array}{ll} \text{Mult.} & aa+ab+bb \\ \text{By} & a-b \\ \text{Prod.} & \left\{\begin{array}{l} aaa+aab+bb \\ \quad\quad -aab-abb-bbb \end{array}\right. \\ \text{Sum} & aaa\,..\,0\,.....\,0\,..-bbb \end{array}$$

MULTIPLYING-*Glaſs*, a lens in which objects appear increaſed in number. It is ground into ſeveral planes that make angles with one another, through which the rays of light, iſſuing from the ſame point, undergo different refractions, ſo as to enter the eye from every ſurface, in a different direction.

MULTISILIQUOUS Plants, thoſe, which have, after each flower, many diſtinct, long, ſlender, ſiliquæ, or pods, in which their ſeed is contained; ſuch are bear's-foot, columbine, houſe-leek, navel-wort, orpine, &c.

MULTITUDE, an aſſemblage, or collection of a great number of diſtinct perſons or things.

MULTIVALVES, in natural hiſtory, the name of a general claſs of ſhell-fiſh; diſtinguiſhed from the univalves, which conſiſt of only one ſhell, and the bivalves, which conſiſt of two; by their conſiſting of three or more ſhells.

MUM, a kind of malt-liquor, much drank in Germany; and chiefly brought from Brunſwick, which is the place of moſt note for making it. The proceſs of brewing mum, as recorded in the town-houſe of that city, is as follows: Take 63 gallons of water that has been boiled till one-third part is conſumed, and brew it with ſeven buſhels of wheaten-malt, one buſhel of oatmeal, and one buſhel of ground beans; when it is tunned, the hogſhead muſt not be filled too full at firſt; as ſoon as it begins to work, put into it three pounds of the inner rind of fir; one pound of the tops of fir and beach; three handfuls of carduus benedictus; a handful or two of the flowers of roſa ſolis; add burnet, betony, marjoram, avens, penny-royal, and wild thyme, of each a handful and a half; of elder-flowers, two handfuls or more; ſeeds of cardamum bruiſed, thirty ounces; bar-

berries

Engraved for The New Dictionary of Arts & Sciences

Plate LIX

facing Muscle

Plate LX

facing Mufcle.

berries bruiſed, one ounce: when the liquor has worked a while, put the herbs and ſeeds into the veſſel; and, after they are added, let it work over as little as poſſible; then fill it up: laſtly, when it is ſtopped, put into the hogſhead ten new-laid eggs unbroken: ſtop it cloſe, and drink it at two years end. Our Engliſh brewers, inſtead of the inner rind of fir, uſe cardamum, ginger, and ſaſſafras; and alſo add elecampane, madder, and red ſanders.

MUMMY, a body embalmed or dried, in the manner uſed by the ancient Egyptians: or the compoſition with which it is embalmed.

MUMMY, among gardeners, a kind of wax uſed in grafting and planting the roots of trees, made in the following manner: Take one pound of black pitch, and a quarter of a pound of turpentine; put them together into an earthen pot, and ſet them on fire in the open air, holding ſomething in your hand to cover and quench the mixture in time, which is to be alternately lighted and quenched till all the nitrous and volatile parts be evaporated. To this a little common wax is to be added; and the compoſition is then to be ſet by for uſe.

MUNDICK, in natural hiſtory, a metallick mineral, more commonly called marcaſite.

MUNICIPAL, in the Roman civil law, an epithet which ſignifies inveſted with the rights and privileges of Roman citizens.

MUNIMENTS, or MINIMENTS, the writings relating to a perſon's inheritance, by which he is enabled to defend his title to his eſtate: or, in a more general ſenſe, all manner of evidences, ſuch as charters, feoffments, releaſes, &c.

MUNIMENT-HOUSE, a little ſtrong room in a cathedral, college, or univerſity, deſtined for keeping the ſeal, charters, &c. of ſuch cathedral, college, &c.

MUNIONS, in architecture, are the ſhort, upright poſts or bars which divide the ſeveral lights in a window-frame.

MUNITION, the proviſions with which a place is furniſhed in order for defence; or that which follows a camp for its ſubſiſtence.

MUNITION-SHIPS, are thoſe that have ſtores on board in order to ſupply a fleet of men of war at ſea. In an engagement, all the munition ſhips and victuallers attending the fleet, take their ſtations in the rear of all the reſt; they are not to engage in the fight, but to attend ſuch directions as are ſent them by the admiral.

MUNTINGIA, in botany, a genus of plants whoſe flower conſiſts of five roundiſh patent petals inſerted in the cup; the ſtamina are a great number of very ſhort capillary filaments, topped with roundiſh antheræ. The fruit is a globoſe, umbilicated berry, containing a great many very ſmall roundiſh ſeeds.

MURAGE, a toll taken of every cart or horſe coming laden into a city, for reparing the walls.

MURAL, in general, any thing belonging to a wall, which the Latins call murus.

MURAL *Arch*, is a wall, or walled arch, placed exactly in the plane of the meridian, for fixing a large quadrant, ſextant, or other inſtrument, in order to obſerve the meridian altitudes of the heavenly bodies.

MURDER, or MURTHER, in law, is the wilful and felonious killing a perſon from premeditated malice; provided the party wounded or otherwiſe hurt, die within a year and a day after the fact was committed.

MURDERERS, or MURDERING *Pieces*, in a ſhip, are ſmall pieces of ordnance, either of braſs or iron, which have chambers put in at their breeches. They are uſed at the bulk-heads of the forecaſtle, half deck, or ſteerage, in order to clear the deck, on the ſhip's being boarded by an enemy.

MURRAIN, or GARGLE, a contagious diſeaſe among cattle, principally cauſed by a hot dry ſeaſon, or rather by a general putrefaction of the air, which begets an inflammation of the blood, and a ſwelling in the throat, that ſoon prove mortal, and is communicated from one to another, though it generally goes no further than to thoſe of the ſame kind. The ſymptoms of this diſeaſe are a hanging down and ſwelling of the head, abundance of gum in the eyes, rattling in the throat, a ſhort breath, palpitation at the heart, ſtaggering, a hot breath, and a ſhining tongue.

In order to prevent this diſeaſe, the cattle ſhould ſtand cool in ſummer, have plenty of good water; all carrion ſhould be ſpeedily buried; and as the feeding of cattle in wet places, on rotten graſs and hay, often occaſions this diſeaſe, dry and ſweet fodder ſhould be given them.

MURREY, in heraldry, a kind of purple colour.

MUSA, the plantain tree, in botany. See the article PLANTAIN.

MUSCADINE, a rich kind of wine, of the growth of Provence and Languedock, in France.

MUSCARI, muſk hyacinth, in botany, a genus of plants, whoſe flower conſiſts of an oval pitcher-ſhaped petal, reflexed at the brim with three nectariums and ſix ſubdulated filaments, topped with antheræ coaleſcing together. The fruit is a roundiſh, trigonal capſule, having three cells, which contain ſeveral roundiſh ſeeds.

MUSCLE, *Muſculus*, in anatomy, a part of the human body, deſtined to move ſome other part, and that in general by a voluntary motion, or ſuch as is dictated by the will; being compoſed principally of fleſh and tendinous fibres, which have alſo veſſels of all kinds, as arteries, veins, nerves, and lymphaticks; all which are ſurrounded by, or encloſed in, one common membrane.

The muſcular fibres are, according to the action they are intended for, of various directions; ſome ſtraight, others oblique, tranſverſe, annular, and ſpiral. Some conſiſt of one uniform ſeries of fibres, and on that account are called ſimple; others are compoſed of various, and often contrary courſes of fibres, and theſe being cloſely arranged together, the large one ſeems to be made up of a number of leſs muſcles, and is therefore called compound; and the more of theſe cluſters of fibres, or ſmaller veſſels, enter into the compoſition of a larger one, the thicker and ſtronger it is.

A muſcle is divided, by anatomiſts, into the body, and the two extremities: the body is alſo called the venter or belly of the muſcle; and that extremity where the muſcle ariſes is called its head, caput; or its beginning, origin, or fixed point: and its other extremity, or end, is called its tail, moveable point, and often its tendon; and, finally, if this be broad and membranous, it is called an aponeuroſis.

In many of the muſcles, both the extremities are moveable: in theſe, that part which of the two is leaſt moveable, is always called the head, and the more moveable part the tail. This, however, cannot be done univerſally; ſince there are caſes in which that extremity of a muſcle, which was before the moveable point, becomes the fixed point; and *vice verſa*, as in the ſerrati antici, and ſome of the muſcles of the abdomen, not to mention any others.

Action of the MUSCLES. This conſiſts in the contraction of its belly, after whatever manner that is done: by this means its extremities approach toward each other; and by this means alſo the part in which the end of the muſcle is inſerted, moves as if it were drawn by a cord. Schelhammer is of opinion, that this contraction of the belly of the muſcle is effected by a corrugation of the fibres, in the ſame manner as we ſee an earthworm ſhorten and contract itſelf by corrugating its ſkin, &c. Morgagni, on the other hand, alledges, that, in order to underſtand the power of motion in a muſcle, we ought to attend to Wallis's experiment; by which it is evidently proved, that the ſmalleſt force imaginable of the air, driven through a cylindrick tube into a bladder, will, by diſtending its width, and ſhortening its length, cauſe it to raiſe up, and ſuſtain a weight of 60 or 70 pounds.

Others have demonſtrated, from hydroſtatical principles, that a very ſmall quantity of a fluid, directed through a ſmall cylindrick tube, placed in a veſſel of a larger baſe, and already filled, will be able, in the ſame manner, to move and raiſe up a large weight; from whence they conclude, that the belly of a muſcle ſwells in the time of its contraction or action; and that this intumeſcence may, nay and muſt, have very great effects.

On the other hand, there are, among the lateſt and moſt celebrated writers, ſome who affirm that the belly of a muſcle does not ſwell or become diſtended at all in the time of its contraction. But it would be well, ſays Heiſter, if the aſſertors of this opinion would, while they forcibly draw up the under jaw to the upper, lay two or three of their fingers upon either the temporal or maſſeter muſcle; for in this caſe they would ſee the moſt evident of all conviction, that, while theſe muſcles act, their bel-

lies are in reality diftended, and rendered firmer. Or let them only, when the hand is placed in a proper fituation, forcibly draw the thumb toward the firft finger, and then they may both fee and feel, that the mufcle between the thumb and the index fwells, or is diftended in its middle, as the action of drawing the thumb is performed. The reader who would enter more deeply into this difquifition, may confult Borelli *de Motu Animalium*; Bernouilli *de Motu mufcul.* Berger's *Phyfiolog.* c. 22. Boerhaave's *Inftitutes*, chap. of mufcular motion; and Mead's *Introduction to* Cowper's *Myographia*.

Among the mufcles, there are different ones that confpire in the fame action, and fo perform the fame motion as affociates: fuch are the flexors or extenfors of the arm, and the like: hence thefe, and fuch others as confpire in the fame manner to the fame action, are called by authors focii and congeneres.

When, on the other hand, we regard the contrary actions of certain mufcles, as the extenfors of any part which act quite contrarily to the flexors, thefe are called antagonift mufcles; in this cafe both the kinds acting together, render the limbs rigid or immoveable: this action of the mufcles is called motus tonicus. It is alfo obfervable, that feveral of the mufcles, confidered fingly and feparately, perform other kinds of motions befides thofe afcribed to them in regard to the whole part: thu the maftoide mufcle, the rectus major capitis, &c. wh they act on both fides, bend the head forwards; but when only on one fide, they draw the head obliqu wards, and to one fide. Hence, from the diverfity of the mufcles, which act either alone or conjunctly with their affociates, or with others, there arife feveral intermediate motions, quite different from the primary ones, and fuch as have not hitherto been fufficiently obferved. This does not only happen in regard to the mufcles of the head, the flexors and extenfors, and the like, but to feveral others; and particularly to thofe of the eyes, the lips, the jaws, the tongue, the neck, the abdomen, the arm, the carpus, &c. Thefe we are carefully to attend to, and explain to ourfelves, by what particular mufcles, acting diftinctly, they are performed; otherwife we fhall never be able to underftand the various and wonderful motions of the parts. Winflow, in his excellent obfervations on the actions of the mufcles, publifhed in the Memoirs of the Paris Academy, obferves, among other curious things, that a great many of the motions of the mufcular parts are not owing to the fuppofed contraction, but to the relaxation of the mufcles on the oppofite fide.

Explanation of *plates* LIX. and LX. reprefenting the mufcles of the human body.

Plate LIX. reprefents the mufcles which are confpicuous in the fore-part.

1. 1. The mufculi frontales. 2. 2. The orbiculares palpebrarum. 3. The attollens auriculam. 4. The temporalis. 5. The maffeter. 6. Reprefents the mufcle called by Lancifi conftrictor, or depreffor pinnæ narium. 7. The dilatator alæ nafi. 8. The zygomaticus. 9. The place of the elevator labiorum, or elevator labiorum communis, called by Lancifi gracilis. 10. The elevator labii fuperioris proprius. 11. 11. The conftrictor or fphincter labiorum, or orbicularis labiorum; by fome called ofculatorius. 12. The buccinator. 13. 13. The mufculi maftoidæi. 14. 14. The fternohyoidei. 15. 15. Thofe parts of thefe mufcles which arife from the clavicle. 16. 16. The coracohyoidei. 17. The fcaleni. 18. Reprefents part of the cucullaris on the right fide. 18. On the left fide is the levator or elevator fcapulæ, otherwife called mufculus patientiæ. 19. 19. The place where the fibres of the pectoralis unite, in fome meafure, with thofe of the deltoides. 20. 20. The deltoides. 21. The place in the carpus, where the palmaris longus paffes through a ring in the annular ligament. 22. A remarkable union of the tendons of the extenfors of the three laft fingers. 23. 23. The productions of the peritonæum, which, perforating the mufcles of the abdomen at the rings, defcend to the fcrotum. 24. 24. The place where the three tendons of the fartorius, gracilis, and feminervofus are inferted into the anterior and internal part of the tibia, juft under the knee. 25. 25. The tendons of the extenfors of the toes, which are fecured by a ligament at the ancle, as appears on both fides. But on the right fide internally another ligament is reprefented, which fixes the tendons of the extenfor longus digitorum, the tibiæus pofticus, and the flexor pollicis. 26. 26. The mufculus pectoralis. 27. The triceps extenfor cubiti on the right fide. 28. and 30. The biceps on the left fide, according to Lancifi's explication. 29. Part of the triceps extenfor on the left fide. 30. The biceps on the right fide. 31. The brachiæus internus. 32. The anconæus. 33. The pronator rotundus. 34. 34. The fupinator longus. 35. 35. The radius externus, according to Lancifi. 36. The extenfor carpi ulnaris. 37. 37. The cubitæus internus, according to Lancifi. 38. The radius internus, according to Lancifi. 39. The palmaris, with its tendinous expanfion. 40. 40. The tendons of the mufcles of the thumb. 41. The tendon of the adductor pollicis. 42. The extenfor magnus digitorum. 43. Ligamentum carpi. 44. 44. The tendons of the iliaci interni. 45. The pectinæus. 46. One of the heads of the triceps. 47. 47. The rectus femoris on each fide. 48. 48. The vaftus externus on each fide. 49. The vaftus internus on each fide. 50. The gracilis. 51. The feminervofus. 52. The fartorius on each fide. 53. A part of the origin of the vaftus externus. 54. 54. The membranofus. 55. 55. The tibialis anticus. 56. The gemelli. 57. 57. The folæi. 58. The tendo Achillis. 59. According to Lancifi, is tenfor digitorum longus. 60. 60. The tendons of e extenfors of the toes. 61. The tendons of the exenfor longus, tibiæus, pofticus, and flexor pollicis. A. A. Portions of the latiffimus dorfi on each fide. B. B. The indentations of the ferratus major anticus. C. C. The fternum.

Explanation of *plate* LX. reprefenting the mufcles of the back part of the human body.

1. Two mufcles upon the occiput called by Euftachius quadrati. 2. The mufculus cucullaris. 3. The fplenius. 4. The mufculus maftoidæus. 5. The mufculus patientiæ, or levator fcapulæ proprius. 6. The rhomboides. 7. The articulation of the clavicle with the fcapula on the right fide. 8. The deltoides. 9. The teres minor. 10. The teres major. 11. 11. The latiffimus dorfi on each fide. 12. The glutæus major. 13. The glutæus medius. 14. The mufculus pyriformis. 15. The quadratus femoris. 16. The biceps femoris. 17. The femi-membranofus. 18. The membranofus, according to Lancifi. 19. 19. The vafti externi. 20. The gaftrocnemii. 21. The foleus. 22. The plantaris.

Muscle, *Mytulus*, in natural hiftory, a fhell compofed of two valves, of an oblong figure; and fhutting clofe all the way; the valves are both convex, and of a fimilar fhape: and the animal inhabiting it is called a tethys.

MUSCULAR, *Mufculous*, fomething relating to the mufcles.

Muscular *Arteries*, in anatomy, two arteries proceeding from the fubclavians, and diftributed among the hind mufcles of the neck. There are alfo certain arteries of the loins, called fuperior and inferior mufculars. See Artery. In the thigh are alfo two arteries called the internal and external mufculars.

Muscular *Fibres*, the fine threads of which the body of a mufcle is compofed. Anatomifts are exceedingly divided as to the nature of thefe fibres. Dr. Morgan endeavours to prove, that all the fibres which enter the ftructure of a mufcle are endued with an intrinfick elafticity, or power of contracting and reftoring themfelves, independent on the mixture, rarefaction, or effervefcence of any fluid whatever.

Muscular *Membrane*, *Membrana mufculofa*, in anatomy, a membrane which is fuppofed to invefl the whole body, immediately under the membrana adipofa, called alfo panniculus carnofus, and membrana mufculorum communis.

Muscular *Motion*, the fame with voluntary motion, as being effected by the contraction and dilatation of the mufcles.

Muscular is alfo applied to feveral veins; two of which come from the fkin and hind mufcles of the thigh, and terminate in the fubclavians. There are three others in the loins, diftinguifhed into fuperior, middle, and inferior; the firft terminates in the trunk of the vena cava, and the two others open into the external iliack vein.

MUSEUM, a name which originally fignified a part of the palace of Alexandria, which took up at leaft one fourth

fourth of that city. This quarter was called the museum, from its being set apart for the muses and the study of the sciences. Here were lodged and entertained the men of learning, who were divided into many companies or colleges, according to the sciences of which they were the professors; and to each of these houses or colleges was allotted a handsome revenue. The foundation of this establishment is attributed to Ptolemy Philadelphus, who here placed his library. Hence the word museum is now applied to any place set apart as a repository for things that have an immediate relation to the arts.

The museum at Oxford, called the Ashmolean museum, is a noble pile of building, erected at the expence of the university, at the west end of the theatre, at which side it has a magnificent portal, sustained by pillars of the Corinthian order. The front, which is to the street, extends about 60 feet, where there is this inscription over the entrance, in gilt characters, *Museum Ashmoleanum, schola naturalis historiæ, officina chymica.*

It was begun in 1679, and finished in 1683, when a valuable collection of curiosities was presented to the university by Elias Ashmole, esquire, which were the same day reposited there. And several accessions have been since made to the museum; among which are hieroglyphicks and other Egyptian antiquities, an intire mummy, Roman antiquities, altars, medals, lamps, &c. and a variety of natural curiosities.

The museum of the late Sir Hans Sloane, contains a noble and valuable collection of the productions of nature and art, and has been lately purchased by the publick for the benefit of the nation.

MUSES, *Musæ, Camenæ, Heliconiades, Parnassides, Aonides, Pierides*, &c. in antiquity, were the fabulous divinities of the heathens, who were thought to preside over the arts and sciences.

The antients admitted nine muses, the daughters of Jupiter and Mnemosyne or Memory, and these were, Calliope, who presided over heroick poetry; Clio, over history; Melpomene, over tragedy; Thalia, over comedy; Euterpe, over wind-musick; Urania, over astronomy; Terpsichore, over the harp; Erato, the lute; and Polyhymnia, rhetorick.

They are painted young, handsome, and modest, being agreeably dressed, and crowned with flowers. Their usual abodes were about mount Helicon in Bœotia, and Parnassus in Phocis. Their business was to celebrate the victories of the gods and inspire the poets.

Under the name of Muse the poets only pray for the genius of poetry, and all the talents and circumstances necessary for the happy execution of their undertaking. So that the muses are of all ages, countries, and religions.

MUSHROOM, in natural history, a very spongious substance, long supposed to have neither seeds nor flowers. There are various kinds of mushrooms; those used among us are the mushrooms of the woods, called morilles, and of the meadows, called champignons, which are gathered in autumn, and esteemed for their whiteness above, the carnation underneath, and the sweetness of their smell. The origin and production of mushrooms has exceedingly puzzled the botanists for a long time; but lately their seeds have been discovered by the learned Mess. Watson and Pickering, which the reader may see in Phil. Transf. N°. 471.

MUSICK, *Musica*, the science that teaches how sounds, under certain measures of tune and time, may be produced, and so disposed, as either in consonance or succession, or both, they may excite agreeable sensations. Musick is naturally divided into speculative and practical.

Speculative MUSICK, is the knowledge of the materia musica, or the various relations of tune and time, which are the principles out of which the pleasure sought is derived.

Practical MUSICK, that which shews how these principles are to be applied; and this we call the art of composition, which is properly the practical part of musick.

MUSK, *Moschus*, in natural history, is a dry, light, and friable substance, of a dark blackish colour, tinged with purple; it is a kind of perfume of a very strong scent, and only agreeable when in a very small quantity, or moderated by the mixture of some other perfume. It is found in a kind of bag or tumour which grows under the belly of a wild beast called moschus. See MOSCHUS.

Musk is brought to us sewed up in a kind of bladder or cases of skin of the bigness of a pigeon's egg, or larger, each containing from two or three drams to an ounce of musk. These are covered with a brownish hair, and are the real capsules in which the musk is lodged while on the animal. That which is unadulterated appears in masses, or loose and friable granules, which are soft to the touch, and easily crumble between the fingers, feeling somewhat smooth and unctuous.

MUSK is a medicine of great esteem in the Eastern countries, and has lately come into use among us; also, in some nervous disorders; though liable, by its strong impression on the organs of smell, to offend and disorder hysterical persons and constitutions of great sensibility, yet, when taken internally, it is found to abate symptoms of that kind, which its smell produces, and to be one of the principal medicines of the antispasmodick class. Dr. Wall informs us, that two persons labouring under a subsultus tendinum, extreme anxiety, and want of sleep, occasioned by the bite of a mad dog, were perfectly relieved by two doses of musk of 16 grains each: that convulsive hiccoughs, attended with the worst symptoms, were removed by a dose or two of 10 grains; that in some cases, where this medicine could not, on account of strong convulsions, be administered by the mouth, it proved of service when injected as a clyster: that he never met with any person, how averse soever to perfumes, but could take it in the form of a bolus without inconvenience: that under the quantity of six grains, he never found much effect from it, but that when given to 10 grains and upwards, it produces a mild diaphoresis, without heating or giving any uneasiness, but on the contrary, abating pain and raising the spirits; and that after the sweat has begun, a refreshing sleep generally succeeds. This medicine has been tried also in some maniacal cases, in which it seemed to procure a temporary relief.

MUSKET, a fire-arm borne on the shoulder, and used in war. The length of the musket is fixed at three feet eight inches from the muzzle to the pan, and it carries a ball of 16 to the pound.

MUSKETOON, a kind of short thick musket, whose bore is the 38th part of its length.

MUSLIN, a fine thin sort of cotton cloth, which bears a downy knap on its surface. There are several sorts of muslins brought from the E. Indies, and more particularly from Bengal; such as doreas, betelles, mulmuls, tanjeebs, &c.

MUSTARD, *Sinapis*, in botany. See SINAPIS.

MUSTER, in the marine, a summoning together the crew of any particular ship, and calling them severally over by their names.

MUTE, in grammar, a letter which yields no sound without the addition of a vowel.

MUTILATION, the retrenching or cutting away any member of the body.

This word is also extended to statues and buildings, where any part is wanting, or the projecture of any member, as a corniche or an impost, is broken off.

MUTULE, in architecture, a kind of square modillion set under the corniche of the Dorick order. See DORICK *Order*.

The only difference between the mutule and modillion consists in this, that the former is used in speaking of the Dorick order, and the latter in the Corinthian.

MUZZLE *of a Gun or Mortar*, the extremity at which the powder and ball is put in; and hence, the muzzle-ring is the metalline circle, or moulding, surrounding the muzzle of the piece.

MYLOGLOSSI, in anatomy, two muscles of the tongue. They are so called, as arising from the roots of the dentes molares. See TONGUE.

MYLOHYOIODÆI, in anatomy, are two muscles of the os hyoides.

MYLO-PHARYNGÆUS, in anatomy, a muscle of the pharynx.

MYOCEPHALUM, in medicine, a small tumour in the uvea tunica of the eye.

MYODES *Platysma*, in anatomy, a muscular expansion in the neck, which is also called quadratus genæ. See NECK.

MYOLOGY, *Myologia*, a treatise or description of the muscles.

MYOPIA, or MYOPIAS, short-sightedness, a species of vision, wherein objects are seen distinctly only at small

ſmall diſtances; which is incident to perſons who have the cornea and cryſtalline, or either of them, too convex. They that are ſhort-ſighted never look attentively at thoſe who ſpeak to them, as being unable to obſerve the motion of their eyes, which contributes greatly to explain and enforce their words; and therefore, they are only attentive to the diſcourſe. Short-ſighted perſons need leſs light than others, to ſee diſtinctly; whence they can read the ſmalleſt print, when others are not able to diſtinguiſh one letter from another. Short-ſighted perſons uſually become leſs ſo, as they advance in years; and that becauſe the humours of the eye waſting, the cornea ſhrinks and becomes leſs convex, and the cryſtalline becomes flatter than before; by which means objects are ſeen more diſtinctly, and at greater diſtances, than when the refraction was ſtronger in the more plump and convex eyes.

MYROBALANS, dried medicinal fruits, of the plumb kind, brought from the E. Indies.

Five ſorts have been diſtinguiſhed in the ſhops; but all of them have an unpleaſant, bitteriſh, very auſtere taſte; and ſtrike an inky blackneſs with ſolution of chalybeate vitriol. They are ſaid to have a gently purgative, as well as aſtringent and corroborating virtue; but in this country, they have long been entire ſtrangers to practice, and are now diſcarded by the colleges both of London and of Edinburgh, from their catalogue of officinals.

MYRRH, *Myrrha*, in natural hiſtory, is a vegetable product of the gum reſin kind. It is ſent over to us in looſe granules of various ſizes, from that of a peppercorn to the bigneſs of a walnut. The generality of them are, from the ſize of a pea, to a little more than that of a horſe-bean. Their figure is not more determinate than their ſize; they are ſometimes roundiſh, often irregularly oblong and contorted. The colour of myrrh is a rediſh brown, with an admixture of yellow; it is tolerably ſmooth on the ſurface in the purer pieces, and ſomewhat tranſparent; and, when broken, there are often ſeen in it orbicular or ſemilunar lines of a whitiſh colour. Its taſte is acrid and bitter, with a peculiar aromatick flavour, but, upon the whole, very nauſeous. Its ſmell is ſtrong, but not diſagreeable. It is, brought to us from Æthiopia, and is to be choſen in clear pieces, light, friable, and of the bittereſt taſte: that which is foul and blackiſh is to be rejected.

The ancients eſteemed myrrh to be very drying and detergent, and others of them celebrated it as a reſolvent. Indeed, it powerfully reſolves and attenuates a thick and viſcid blood, a concreted bile, and glutinous humours, and is good in obſtructions of the menſes, and in infractions of the viſcera. It alſo promotes delivery, and the expulſion of the ſecundines, and is good in aſthmas, and in caſes of tubercles of the lungs; in the jaundice alſo, it has been known to do great ſervice, and in cachectick complaints. It deſtroys worms, ſtrengthens the ſtomach, and diſſipates flatulencies.

Externally applied, it is diſcutient and vulnerary; it cleanſes old ulcers, and diſpoſes them to heal. Though myrrh have all theſe virtues, it is not to be given without caution. It is an obſervation as old as the time of Galen, that myrrh will give many people the head-ach; even the ſmell of it will ſometimes have this effect. As it promotes diſcharges of blood of whatever ſpecies, it is by no means to be given to any body that is ſubject to diſeaſes of that kind, as ſpitting of blood, or the like; and women, in the time of their pregnancy, muſt by no means take it, leſt it procure abortion.

MYRTIFORMES, *Caruncula*, in anatomy, little caruncles or fleſhy knots adjoining to, or rather in the place of the hymen in women.

MYRTLE, *Myrtus*, in botany, a genus of plants, the flower of which conſiſts of a monophyllous cup, in which are inſerted five large oval petals, with a great number of hairy filaments topped with ſmall antheræ: the fruit is an oval berry, with three cells, containing in each a kidney-ſhaped ſeed.

There are ſeveral ſorts of myrtle, ſuch as the broad-leaved myrtle, narrow-leaved myrtle, nutmeg myrtle, orange myrtle, variegated myrtle, with ſeveral other varieties. They may be all propagated from cuttings, or ſlips, in the ſummer; making choice of the moſt vigorous ſhoots of the ſame year's growth: they ſhould be planted in pots and covered with glaſſes, which prevents the air from getting at them, and facilitates their taking root. When winter comes on, they ſhould be removed into a green-houſe; and the ſpring following, they may be tranſplanted ſingly into ſmall pots. In hot weather, they ſhould have plenty of water.

MYSTERY, any thing hidden or ſecret, and difficult, if not impoſſible to be diſcovered.

MYSTICAL, ſomething myſterious or allegorical.

MYSTICKS, a religious ſect, diſtinguiſhed by their profeſſing a pure, ſublime, and perfect devotion, with an intire diſintereſted love of God, free from all ſelfiſh conſiderations, and by their aſpiring to a ſtate of paſſive contemplation.

MYTHOLOGY, μυθολογία, the hiſtory of the fabulous gods and heroes of antiquity, with the explanations of the myſteries or allegories couched therein. Lord Bacon thinks that a great deal of concealed inſtruction and allegory was originally intended in moſt part of the ancient mythology; he obſerves, that ſome fables diſcover a great and evident ſimilitude, relation, and connection with the thing they ſignify, as well in the ſtructure of the fable, as in the meaning of the names, whereby the perſons or actors are characterized.

The ſame writer thinks it may paſs for a further indication of a concealed and ſecret meaning, that ſome of theſe fables are ſo abſurd and idle in their narration, as to ſhew an allegory even afar off: but the argument of moſt weight upon this ſubject he takes to be this, that many of theſe fables appear by no means to have been invented by the perſons who relate them: he looks on them not as the product of the age, not invention of the poets, but as ſacred relicks, as he terms them, gentle whiſpers, and the breath of better times, that from the tradition of more ancient nations, came at length into the flutes and trumpets of the Greeks. He concludes, that the knowledge of the early ages was either great or happy; great if they, by deſign made this uſe of trope and figure; or happy, if whilſt they had other views, they afforded matter and occaſion to ſuch noble contemplations.

MYURUS, in medicine, an epithet for a ſort of ſinking pulſe, when the ſecond ſtroke is leſs than the firſt; the third than the ſecond, and ſo on. Of this, there are two kinds; the firſt, when the pulſe ſinks ſo as never to ariſe; the other, when it returns again, and riſes in ſome degree. Both are eſteemed a bad preſage.

N.

N, A liquid consonant, and the thirteenth letter of the Greek, Latin, English, &c. alphabets. It is formed from the old Greek, and that from the old Hebrew nun. Its sound is formed by a strong expression of the voice through the mouth and nostrils, being at the same time intercepted by applying the tongue to the fore palate, and the lips or mouth open. It suffers no consonant immediately after it in the beginning of words or syllables; nor any before it but *g*, *k*, and *s*, as *gnaw*, *knave*, *snow*, &c.

As a numeral, N stands for 900; according to the verse in Baronius,

N, quoque Nongentos numero designat habendos.

And when a line was struck over it, $\bar{N}$ 9000. N, or N°, stands for *numero*, i. e. in number; and N. B. for *nota bene*, note well, or observe well.

Among the ancient Romans, N denotes *Nepos*, *Nonnius*, &c. N. C. Nero Cæsar, or Nero Claudius: N. L. *non liquet*, meaning that the cause was not clear enough for sentence; N. P. *notarius publicus*; and NBL, stands for *nobilis*.

NAAM, in law, the detaching or distraining a person's moveable goods; as where a man takes another man's beast for doing damage in his ground; or where it is done in consequence of another man's act, as when it is agreed, that in default of payment of some contract, it shall be lawful to distrain on lands charged therewith.

NABOB, a viceroy, or governor of one of the provinces of the Mogul's empire, in India.

NABONASSAR, or *Æra of* NABONASSAR, a method of computing time from the commencement of Nabonassar's reign. See EPOCHA. The epocha of Nabonassar is of the greatest importance, as Ptolemy and other astronomers account their years from it.

NADAB, the sovereign pontiff, or high priest of the Persians, whose dignity is the same as that of the mufti among the Turks; with this difference only, that the nadab may divest himself of his ecclesiastical office, and pass to civil employments, which the mufti is not allowed to do.

NADIR, in astronomy, a point in the heavens diametrically opposite to the zenith; being a point directly under our feet in a right line drawn through the centre of the earth, and terminating in the inferior hemisphere. The zenith and nadir are the two poles of the horizon, each 90° distant from it, and, consequently, each in the meridian.

Sun's NADIR, in astronomy, is the axis of the cone projected by the earth's shadow; it is so called, because being produced, it gives a point in the ecliptick diametrically opposite to the sun.

NAHUM, or *the Prophecy of* NAHUM, a canonical book of the Old Testament. Nahum, the seventh of the twelve less prophets, was a native of Elkoshai, a little village of Gallilee. The subject of his prophecy is the destruction of Nineveh, which he describes in the most lively and pathetick manner; his stile is bold and figurative, and can hardly be exceeded by the most perfect masters of oratory. This prophecy was verified at the siege of that city by Astyages, in the year of the world 3378, 622 years before Christ.

The time of Nahum's death is unknown; the Greek menologies, and the Latin martyrologies, place his festival on the first of December.

NAIADS, *Naids*, *Naiades*, in antiquity, a kind of nymphs or fabulous deities supposed to preside over fountains and rivers.

NAIANT, NAGEANT, or NATANT, in heraldry, denotes the blazoning of fishes, when drawn in an horizontal posture, fess-wise, or transversely across the escutcheon; that being their swimming posture.

NAIL, *Unguis*, a horny substance growing over the ends of the fingers and toes of a human body.

NAIL, also signifies the 16th part of a yard.

NAILS, in building, small spikes of iron.

NAILING *of Cannon*, the driving an iron nail or spike into the touch-hole of a piece of artillery; whereby it is rendered useless, for some time at least.

NAKED, in architecture, the surface or plane of a wall, whence the projectures arise. Thus a pilaster ought to exceed the naked of the wall by so many inches; and the foliages of a capital ought to answer to the naked of the column.

NAKED *Fire*, in chymistry, an open fire, where the containing vessel is immediately exposed to the fire.

NAKED *Seeds*, in botany, such seeds as are not contained in any pod or case.

NAMATION, *Namatio*, in law, the act of distraining.

NAME, denotes a word whereby some idea, thing, &c. spoken of, is expressed; which is of fuller extent than what the grammarians call noun.

Proper NAMES, those names which represent some individual person or thing, so as to distinguish it from all others of the same species; as *Cicero*, &c.

Appellative or *general* NAMES, those names which signify common ideas, being common to several individuals of the same species, as *cow*, *sheep*, *animal*, &c.

NAPÆÆ, in antiquity, heathen goddesses supposed to preside over forests and hills.

NAPE, the hind part of the neck.

NAPHTHA, by the ancients called *oleum Medeæ*, in natural history, a very pure, clear, and thin mineral fluid, though much less so than the petroleum. It is thinner than the expressed vegetable oils, but somewhat thicker than the fine distilled ones. It is of a very pale yellow with a cast of brown in it. It has a sharp taste, and a very penetrating smell of the bituminous kind, and approaches somewhat to that of the distilled oil of amber. When pure, it will burn wholly away. And, in places where it is common, it exhales a vapour that takes fire at the approach of any flame, and burns a pretty way. It is found floating on springs that issue out of the sides of hills in Persia, Tartary, &c. It is not known to be any where produced in Europe. As the substance remaining at the bottom of the retort has much the resemblance of amber, it seems highly probable that amber is from the same sort of principle.

The medicinal virtues of the naphtha are the same with those of common petroleum, but in a more remiss degree. It is used externally on many occasions in Persia, and a few drops for a dose taken inwardly in cholicks. The principal use that is made of it is for burning in lamps, it not consuming so quick as the petroleum, and is of a less offensive smell, but it makes more smoke.

NARCISSUS, the DAFFODIL, in botany, a genus of the hexandria monogynia class. The corolla consists of six leaves, and the nectarium of one entire funnel-shaped leaf; and the stamina are situate within the nectarium. There are 13 species, only two of which are natives of Britain; viz. the poeticus, common pale daffodil, or primrose peerless; and the pseudo-narcissus, or wild English daffodil. The root of the common daffodil is emetick, vulnerary, and detergent.

NARCOTICKS, in medicine, opiates, or medicines which excite sleep. See OPIATES.

NARDUS, SPIKENARD, in botany, a genus of the triandria-digynia class. It has no calix, and the corolla consists of two valves. There are five species, only one

one of which, viz. the ſtricta, or malt-graſs is a native of Britain.

This plant is cephalick and ſtomachick; it is recommended in nephritick caſes, and as a promoter of the menſes. It is alſo given in chronick caſes to remove obſtructions of the viſcera: however the modern practice does not uſe it much, except as an ingredient in ſome of the officinal compoſitions. It has a very fragrant aromatick ſmell and taſte.

NARRATION, in oratory and hiſtory, a recital or rehearſal of a fact as it happened, or when it is ſuppoſed to have happened.

NARRATION, in poetry, is uſed for the action, or event, that makes the ſubject of an epick poem.

NARWAL, in ichthyology, the unicorn fiſh, ſo called from a long wreathed tooth, ten or more feet in length, which has more the appearance of a horn than a tooth; though it be really a tooth fixed in the gomphoſis of the upper jaw, altogether in the manner of other teeth: hence ſome have called it monodon, which is certainly a more proper name than that of the unicorn fiſh. It is a fiſh of the whale kind, often growing to 25 feet in length, but is more commonly found from 16 to 20.

NASIAS, in anatomy, a thin bone making the upper part of the noſe.

NASTURTIUM, *creſſes*, in botany, the name of a genus of plants, of which there are 14 different ſpecies, according to Tournefort.

Water-creſſes are frequently eaten as a ſallad in the ſpring. The whole plant is of a very acrid taſte, and is a powerful attenuant and reſolvent. It is recommended as a kind of ſpecifick in the ſcurvy, and is good againſt all obſtructions of the viſcera, and conſequently in jaundices, and other chronick diſeaſes. It is alſo a powerful diuretick and promoter of the menſes. The beſt way of taking it is either as a ſallad, or to drink its expreſſed juice ſingly, or mixed with that of other antiſcorbutick plants, as brooklime, &c. which is often done.

NATES, in anatomy, a term expreſſing thoſe two fleſhy exterior parts of the body, vulgarly called the buttocks.

NATES CEREBRI, two circular protuberances of the brain, ſituated on the back ſide of the medulla oblongata, near the cerebellum.

NATION, a collective term uſed for a conſiderable people inhabiting a certain extent of land, confined within fixed limits, and under the ſame government.

NATIVE, a perſon conſidered as born in a certain place which was the proper reſidence of his parents, and where he received his education.

NATIVE, or NATIVUS, in our ancient law-books, ſignifies a perſon born in the ſtate of villainage, in contradiſtinction to a bonds-man, or one who became a villain by his own act and deed.

NATIVITY, or NATAL-DAY, the day of a perſon's birth. The word nativity is chiefly uſed in ſpeaking of the ſaints, as the nativity of St. John the Baptiſt, &c. But when we ſay the nativity, it is underſtood of that of Jeſus Chriſt, or the feaſt of Chriſtmas.

NATIVITY, in old law-books, ſignifies villainage or ſervitude.

NATIVITY, in aſtrology, the ſituation of the heavens, and particularly of the twelve houſes at the moment of a perſon's birth.

NATOLIA, the modern name of the Leſſer Aſia, being the moſt weſterly part of Turkey in Aſia, and conſiſting of a large peninſula, which extends from the river Euphrates, as far as the Archipelago, the ſeas of Marmora, the ſtraits of Galipoli and of Conſtantinople, which ſeparate it from Europe on the weſt. It is bounded on the north by the Black Sea, and on the ſouth by the Mediterranean ſea.

NATRUM, the nitre of the ancients, in natural hiſtory, is a genuine, pure and native ſalt, extremely different from our nitre, and indeed from all the other native ſalts; it being a fixed alkali, plainly of the nature of thoſe made by fire from vegetables, yet capable of a regular cryſtallization, which thoſe ſalts are not. It is found on the ſurface of the earth, or at very ſmall depths within it, and is naturally formed into thin and flat cakes or cruſts, which are of a ſpongy or cavernous ſubſtance, very light and friable, and when pure, of a pale browniſh white; but as its ſpongy texture renders it very ſubject to be fouled by earth received into its pores, it is often met with of a deep dirty-brown, and not unfrequently rediſh.

NATURAL, in general, ſomething that relates to nature.

NATURAL *Children*, are thoſe born out of lawful wedlock.

NATURAL *Horizon*, the ſenſible or phyſical horizon.

NATURAL *Faculty*, in phyſick, denotes, according to Quincy, that power ariſing from the circulation of the blood which is obſervable in all the ſecretions of the body, excepting that made at the origin of the nerves.

NATURAL *Functions*, in the animal œconomy, thoſe actions whereby things taken into the body are aſſimilated, ſo as to become parts thereof.

Thoſe are the actions of the viſcera, the veſſels that receive, move, change, &c. the humours of the body.

NATURAL *Inclinations*, thoſe tendencies of the mind or out goings of the affections, neither changed by grace nor governed by the effects of education.

NATURAL *Hiſtory*, a deſcription of the natural production of the earth, water, or air. See ANIMAL, BOTANY, ORNITHOLOGY, &c.

NATURALIST, a perſon verſed in the ſtudy of nature, eſpecially metals, minerals, ſtones, vegetables, animals, &c.

NATURALIZATION, in law, the act of enfranchiſing an alien; that is, putting him in the condition of a natural born ſubject, and intitling him to the privileges belonging thereto. In France this is the king's prerogative. In England it is done by act of parliament. Swiſs, Savoyards, and Scots need not any naturalization in France, being reputed as natives.

NATURALS, *Res naturales*, in phyſick, that degree of life and ſtrength, with the cauſes and effects of each that remains in every animal, in contradiſtinction to non-naturals.

NATURE, *Natura*, according to Mr. Boyle, has eight different ſignifications; it being uſed, 1. For the Author of nature, whom the ſchoolmen call *Natura Naturans*, being the ſame with God. 2. By the nature of a thing we ſometimes mean its eſſence; that is, the attributes which make it what it is, whether the thing be corporeal or not; as when we attempt to define the nature of a fluid, of a triangle, &c. 3. Sometimes we confound that which a man has by nature, with what accrues to him by birth; as when we ſay, that ſuch a man is noble by nature. 4. Sometimes we take nature for an internal principle of motion; as when we ſay, that a ſtone by nature falls to the earth. 5. Sometimes we underſtand by nature the eſtabliſhed courſe of things. 6. Sometimes we take nature for an aggregate of powers belonging to a body, eſpecially a living one; in which ſenſe phyſicians ſay, that nature is ſtrong, weak, or ſpent; or that, in ſuch and ſuch diſeaſes, nature left to herſelf will perform the cure. 7. Sometimes we uſe the term nature for the univerſe, or whole ſyſtem of the corporeal works of God; as when it is ſaid of a phœnix, or chimera, that there is no ſuch thing in nature. 8. Sometimes too, and that moſt commonly, we expreſs by the word nature a kind of ſemi-deity, or other ſtrange kind of being.

If, ſays the philoſopher, I were to propoſe a notion of nature, leſs ambiguous than thoſe already mentioned, and with regard to which many axioms, relating to that word, may be conveniently underſtood, I ſhould firſt diſtinguiſh between the univerſal and the particular nature of things. Univerſal nature I would define to be the aggregate of the bodies that make up the world, in its preſent ſtate, conſidered as a principle; by virtue whereof they act and ſuffer, according to the laws of motion preſcribed by the Author of all things. And this makes way for the other ſubordinate notion; ſince the particular nature of an individual conſiſts in the general nature, applied to a diſtinct portion of the univerſe; or, which is the ſame thing, it is a particular aſſemblage of the mechanical properties of matter, as figure, motion, &c. Thoſe who deſire a more particular diſcuſſion of each of theſe opinions may conſult Boyle's Free Inquiry into the vulgar notion of nature.

Laws of NATURE. See LAWS *of Nature*.

NATURE, in proſody; a ſyllable is ſaid to be long

or short by nature, when it is so independently of any rule of grammar.

NAVAL, something relating to shipping or navigation.

NAVAL *Architecture*. See the article SHIP.

NAVAL *Crown*, *Corona navalis*, in antiquity, a crown conferred, among the Romans, on persons who, in sea engagements, distinguished themselves. Though A. Gellius says, in general, the naval crown was adorned with prows of ships, Lipsius distinguishes two kinds; the first he supposes plain, and given to the common soldiers; the other rostrated, and only given to generals, or admirals, who have gained some important victory at sea.

NAVE, *Pronaos*, *Cella*, in architecture, the body of a church, reaching from the rail of the choir to the principal door.

NAVEL, *Umbilicus*, in anatomy. See UMBILICUS.

NAVIGATION, *Navigatio*, the art, or act of conducting a ship through the wide and pathless ocean, the safest, shortest, and most commodious way. This word, in its full latitude, comprizes the art of building ships, the loading of ships, and the conducting them through the sea, which last is more peculiarly called navigation, or sailing; so that it is either common or proper. See SAILING.

Common NAVIGATION, or coasting, where the vessel is seldom out of sight of land, or reach of sounding. In this an acquaintance with the coasts, compass, and sounding line are sufficient.

Proper NAVIGATION, where the voyage is out in the main ocean. Here, besides the former requisites, it is necessary to know the use of Mercator's chart, azimuth and amplitude, compasses, log-line, quadrant, forestaffs, &c. for celestial observations.

Navigation turns principally on four things, two of which being known, the other two are easily found from them by the tables, scales and charts. The four things are the difference of latitude, difference of longitude, the reckoning or distance run, and the course or rhumb sailed on.

The latitudes are easily found, and with sufficient accuracy. The course and distance are had by the log-line, or dead reckoning, and the compass. There is nothing wanting to the perfection of navigation, but to determine the longitude: towards which many attempts have been made by the mathematicians of all ages. See LONGITUDE.

The Phœnicians, especially those of Tyre, are represented in history as the first navigators. Tyre whose immense riches and power are represented in such lofty terms, both in sacred and profane authors, being destroyed by Alexander the Great, its navigation was transferred to Alexandria by the conqueror: and thus arose the navigation of the Egyptians, which was afterwards so cultivated by the Ptolemies, that Tyre and Carthage, which last was subdued by the Romans, were quite forgot.

At length Alexandria itself underwent the fate of Tyre and Carthage, being surprized by the Saracens, who in spite of Heraclius, over-run the northern coasts of Africa, &c. so that Alexandria has ever since been in a declining state.

Upon the fall of the Roman empire, the more brave among the Franks in Gaul, the Goths in Spain, and the Lombards in Italy, were no sooner settled, than they began to learn the advantage of navigation and commerce, and the methods of managing them, from the people they had subdued; and in a little time some of them became able to give new instructions for its advantage.

The people of Italy, and particularly those of Venice and Genoa, were the first restorers of navigation and commerce to the marshy islands in the bottom of the Adriatick; the Veneti who inhabited along the coasts of that gulph retired, when Alarick, king of the Goths, and afterwards Attila, king of the Huns, ravaged Italy.

Each of the 72 islands of the Adriatick continued a long time under its respective masters, as a distinct commonwealth, the commerce becoming considerable, they began to think of uniting into a body: and it was this union first began in the 6th century, but not completed till the 8th, that laid the foundation of the future grandeur of the Venetians.

From the time of this union the fleets of merchant-men were sent to all the parts of the Mediterranean, and at last to Grand Cairo, a city built by the Saracens on the eastern banks of the Nile.

Thus they flourished till the famous league of Cambray in 1508, when a number of jealous princes conspired to their ruin; which was the more easily effected by the Portuguese getting one part of the E. India commerce, and the Spaniards another.

Genoa, which had applied to navigation at the same time with Venice, disputed with it the empire of the sea. Jealousy soon began to break out, and, the two republicks coming to blows, it was three centuries almost continual war, before the superiority was ascertained; when, towards the end of the 14th century, the fatal battle of Chioza ended the noble strife. The Genoese, who till then had usually had the advantage, had now lost all; and the Venetians secured to themselves the empire of the sea, and superiority in commerce.

About the same time that navigation was retrieved in the southern parts of Europe, a new society of merchants was formed in the north, who framed a new scheme of laws for the regulation of commerce, called still the usages and customs of the sea.

In examining the reasons of commerce passing successively from the Venetians, Genoese, and Hanse towns, to the Portuguese and Spaniards; and from those again to the English and Dutch; it may be established as a maxim, that the relation betwixt commerce and navigation, or rather their union, is so intimate, that the fall of the one inevitably draws after it that of the other.

Hence so many laws, &c. for its regulation; and particularly that celebrated act of navigation in England, which is the standing rule, not only of the English among themselves, but also of other nations with whom they traffick.

Till this act, all nations were at liberty to import into England all kinds of merchandizes, and that on their own bottom. But Cromwell particularly passed an act, prohibiting the Dutch from importing any merchandizes, except those of their own growth, which were very few. The first parliament of Charles II. after the restoration, passed an act, bearing date from the first of December 1660, for the encouraging and increasing of shipping and navigation, which still subsists in its full latitude and vigour. See 12 Car. II. c. 18. and 13 and 14 Car. II. c. 11.

NAUMACHIA, in antiquity, a spectacle among the Romans, representing a sea-fight, as also the place where it was exhibited.

NAUSEA, in medicine, properly denotes the sickness people perceive, when on board a ship: it likewise is applied to all propensities to vomit. Boerhaave defines it to be a retrogade spasmodick motion of the muscular fibres of the œsophagus, stomach, and intestines, attended with convulsions of the abdominal muscles, and septum traversum.

NAUTICAL PLANISPHERE, in navigation, a description of the terrestrial globe upon a plane, for the use of sailors. See PLANISPHERE.

NAUTILUS, in natural history, a kind of turbinated sea-shell, of a compressed figure, having the volute hid within the body, frequently dug up at land, and often found petrified.

NAVY, the whole fleet of ships of war belonging to Great Britain. The direction of the navy royal of England is in seven commissioners, who are called lords of the admiralty, there being at present no lord high admiral. In ancient times the kings of England commanded the fleets in person, and as early as king Arthur the sovereignty of the seas was asserted, his successor to this very day claiming and maintaining the same privilege of all nations.

NAZARENES, in church history, a name originally given to all Christians in general, on account that Jesus Christ was of the city of Nazareth; but afterwards restrained to a set of hereticks, whose religion consisted of a strange jumble of Judaism and Christianity; observing at the same time the Mosaick law, and the several rites of the Christian religion.

NAZARITES, among the Jews, persons who either of themselves, or by their parents, were dedicated to the observation of Nazariteship. They were of two sorts; namely, such as were bound to this observance for only

a ſhort time, as a week or month; or thoſe who were bound to it all their lives. All that we find peculiar to the latter's way of life, is, that they were to abſtain from wine and all intoxicating liquors, and never to ſhave or cut off the hair of their heads. The firſt ſort of Nazarites were moreover to avoid all defilement; and if they chanced to contract any pollution before the term was expired, they were obliged to begin afreſh. Women as well as men might bind themſelves to this vow.

NEAT, or NET-WEIGHT, the weight of a commodity alone, clear of the caſk, bag, caſe, or even filth. See WEIGHT.

NEBEL, NABAL, in Jewiſh antiquity, the ſame with the pſaltery. See PSALTERY.

NEBULOUS. CLOUDY, in aſtronomy, a term applied to certain of the fixed ſtars, which ſhew a dim hazy light, being leſs than thoſe of the ſixth magnitude, and therefore ſcarce viſible to the naked eye.

NEBULY, or NEBULEE, in heraldry, is when a coat is charged with ſeveral little figures in form of words, running within one another, or when the outline of a bordure, ordinary, &c. is indented or waved.

NECESSARY, in a philoſophical ſenſe, that which cannot but be, or cannot be otherwiſe. See the next article.

NECESSITY, whatever is done by a neceſſary cauſe, or a power that is irreſiſtible, in which ſenſe it ſtands oppoſed to freedom. See FREEDOM.

NECK, *Collum*, in anatomy, is that ſlender part ſituated between the head and the trunk of the body.

The neck conſiſts of the following parts: 1. The common integuments: 2. Seven vertebræ: 3. A number of muſcles which ſerve to move the head, the neck, the larynx, the pharinx, and the os hyoides: 4. A number of very large arteries, as the carotids, internal and external, and the vertebral ones: 5. Of large veins, as the jugular, internal and external, and the vertebral ones: 6. Of large nerves, of the par vagum, the intercoſtals, the recurrent, the diaphragmaticks, and the vertebral: 7. A part of the ſpinal marrow: 8. The aſpera arteria, or trachea, particularly the larynx, in which is an eminence called the pomum adami: 9. The pharynx, with a part of the oeſophagus: 10. The thyroide, with ſome other ſmaller glands. See LARYNX, PHARYNX, JUGULAR, &c.

Luxation of the NECK. If life remain after ſuch an accident, the patient is to be immediately laid flat on the ground or floor; then the ſurgeon, laying hold of his head, is to extend it ſtrongly, gently moving it from ſide to ſide, till he finds that the neck is reſtored to its natural poſture. Mr. Petit mentions another method, by means of ſlings; but Heiſter gives the preference to the former method, both as being more ſimple, and becauſe the patient can be relieved much ſooner.

NECROSIS, in medicine, a term ſometimes uſed for a mortification, or Sphacelus. See SPHACELUS.

NECTAR, νεκταρ, among ancient poets, the drink of the fabulous deities of the heathens, in contradiſtinction from their ſolid food, which was called ambroſia. See AMBROSIA. This word is alſo uſed by ſome of the ancients to expreſs honey.

NECTARINE, a fruit differing nothing from the common peach, of which it is a ſpecies, than in having a ſmoother rind and a firmer pulp.

NEEDLE, *Acus*, a very common little inſtrument or utenſil, made of ſteel, pointed at one end, and pierced at the other, uſed in ſewing embroidery, tapeſtry, &c.

Magnetical NEEDLE, in navigation, a needle touched with a loadſtone, and ſuſtained on a pivot or a centre, on which playing at liberty, it directs itſelf to certain points in or under the horizon; whence the magnetical needle is of two kinds, viz. horizontal and inclinatory. See the article MAGNET.

NEGATION, in logick, an act of the mind, affirming one thing to be different from another; as, that the ſoul is not matter.

NEGATIVE, in general, ſomething that implies a negation: thus we ſay, negative quantities, negative ſigns, negative powers, &c. See QUANTITY, SIGN, POWER, &c. Our words and ideas, ſays Dr. Watts, are ſo unhappily linked together, that we can never know which are poſitive, which negative ideas, by the words that expreſs them; for ſome poſitive terms denote a negative idea, as dead; and there are both poſitive and negative terms invented to ſignify the ſame and contrary ideas, as unhappy and miſerable. To this may alſo be added, that ſome words, which are negative in the original language, ſeem poſitive in Engliſh, as Abyſs. The way therefore to know whether any idea be negative or not, is to conſider whether it primarily implies the abſence of any poſitive being, or mode of being; if ſo, then it is a negative idea, otherwiſe a poſitive one.

NEHEMIAH, a canonical book of the Old Teſtament, ſo called from the name of its author. Nehemiah was born at Babylon during the captivity, and ſucceeded Ezra in the government of Judah and Jeruſalem. He was a Jew, and was promoted to the office of cup-bearer to Artaxerxes Longimanus, king of Perſia; when the opportunities he had of being daily in the king's preſence, together with the favour of Eſther the queen, procured him the favour of being authorized to repair and fortify the city of Jeruſalem, in the ſame manner as it was before its deſtruction by the Babylonians. On his going to Jeruſalem, he finiſhed the rebuilding of the walls in fifty-two days, and dedicated the gates of the city with great ſolemnity. He then reformed ſome abuſes which had crept in among his countrymen, particularly the extortion of the uſurers, by which the poor were ſo oppreſſed as to be forced to ſell their lands and children for ſupport. After which he returned to Perſia, and came back again with a new commiſſion, by virtue of which he regulated every thing relating both to the ſtate and religion of the Jews. The hiſtory of theſe tranſactions is the ſubject of this book.

NEMEAN GAMES, in antiquity, one of the four great games celebrated among the Greeks at Nemea, a village and grove between the cities Cleonæ and Phlius, and that every third year, upon the twelfth of the Corinthian month Panemos, the ſame with the Athenian Boedromion. The exerciſes were chariot races, and all the parts of the Pentathlum. The judges were choſen out of Corinth, Argos, and Cleonæ, and dreſſed in black, as theſe games were a funeral ſolemnity, inſtituted in memory of Opheltes, otherwiſe Archemorus, who was ſlain by a ſerpent. Others think that theſe games were inſtituted by Hercules, after his victory over the Nemean lion, in honour of Jupiter. The victors were crowned with parſley or ſmallage, which were herbs uſed at funerals.

NEMINE CONTRADICENTE, denotes the carrying of any matter with the univerſal conſent of all the members of a court, &c.

NENIA, *Nænia*, in antiquity, a funeral ſong ſung to the muſick of flutes by the præficæ. Nenia alſo denoted the goddeſs of tears and funerals.

NEOMENIA, in chronology, &c. denotes a feſtival kept at every new moon, particularly among the Jews.

NEPENTHE, *Nepenthes*, in antiquity, a magick potion, whereby perſons forgot all their pains and misfortunes.

NEOPHYTES, new plants, a name given by the ancient Chriſtians to thoſe Heathens who had newly embraced the faith.

NEPIER's, or NAPIER's *Bones*, an inſtrument invented by J. Nepier, baron of Merchiſton in Scotland, whereby the multiplication and diviſion of large numbers are much facilitated, but is now rarely uſed.

NEPHRITICK, ſomething relating to the kidnies.

NEPHRITICK WOOD, *Lignum Nephriticum*, an American wood, brought to us in large compact ponderous pieces, without knots; the outer part is of a whitiſh, or pale yellowiſh colour; the medullary ſubſtance of a dark browniſh or rediſh. This wood ſtands greatly recommended in difficulties of urine, nephritick complaints, and all diſorders of the kidneys and urinary paſſages; and is ſaid to have this peculiar advantage, that it does not, like the warmer diureticks, heat or offend the parts. The blue aqueous tincture is directed to be uſed as common drink, and freſh water to be poured on the remaining wood ſo long as it communicates any blueneſs. For medicinal purpoſes Geoffroy ſays, he has ſeen ſome inſtances of its being uſed, but without ſucceſs; and indeed, whatever may be the virtues of ſtrong infuſions or extracts of the wood, the exceedingly dilute blue tincture cannot be expected to have much efficacy.

NEPHRITIS, *Dolor nephriticus*, or *nephritick Cholick*, in medicine, a painful diſeaſe occaſioned by the ſtone or gravel

gravel in the kidnies, in which there is an inflammation. The disorder, when the inflammation is known to be present, is to be cured first by the general remedies appropriated to the cure of all inflammations, as venesection, revulsion, and dilution; secondly, by mild, emollient, and antiphlogistick decoctions drank in large quantities. Thirdly, this species of the disorder is cured by clysters, fomentations, and baths: And, fourthly, by mild and moist aliments, by rest, by not lying too warm in bed, and especially not lying on the back. If the pains and convulsions are excessively violent, opiates are beneficial. The excessive vomiting is to be relieved by a frequent exhibition of tepid water edulcorated with honey. Thus, a nephritis arising from a stone impacted in the ureters and kidnies may be safely cured.

NEPOTISM, denotes, in Italy, the authority which the pope's nephews and relations have in the administration of affairs, and the care the popes have to raise and enrich them.

NEPTUNALIA, in antiquity, feasts held on the tenth of the calends of August in honour of Neptune.

NEPTUNE, in the heathen mythology, the god of the sea. The poets tell us he was the son of Saturn and Ops, and the brother of Jupiter and Pluto.

NEREIDS, *Nereides*, in antiquity, fabulous deities, or sea-nymphs. They were fifty in number, all the daughters of Nereus by the nymph Doris.

NERVES, *nervi*, in anatomy, are cylindrical whitish parts, usually fibrose in their structure, or composed of clusters of filaments, arising from the brain, or rather from its medulla oblongata within the skull, and from the spinal marrow, and running from thence to every part of the body.

Structure and Use of the NERVES. This is easily perceived in most of the larger, and some of the smaller ones; for besides the blood-vessels they receive, and the membranes they are surrounded with, they are seen to be composed of a fibrous matter, or, as it were, of bundles or clusters of white, cylindrical, and very slender filaments; which, on the strictest examination, appear to be solid, and without any cavity. Liewenhoeck indeed affirms, that he had often found a cavity in them; but he is not free from errors in many of his microscopical observations. But though we cannot discover any cavity, much less a fluid contained in them; yet it is very possible that there may be such cavities, and such a fluid, only too small to be perceived by us: and for the actual existence of such a fluid, known by the name of animal spirits, many probable arguments are adduced.

The great use of the nerves, therefore, though we are not able perfectly to demonstrate it, seems to be to convey to all parts of the body a fluid of an extremely subtile kind, secreted in the brain and spinal marrow, and destined for no less noble a purpose than the sensation, motion, and nutrition of the several parts of the whole human fabrick. Those who would enter farther into this subject, may consult Heister's Anatomy; Boerhaave's Chapter on the Brain, in his Institutes; Morgagni's Adversar. where he treats it judiciously and deeply; and after these, Burggrave on the Existence of the Animal Spirits. See BRAIN.

Origin, Distribution, and Names of the NERVES. The nerves are usually divided into two kinds, those which arise from the brain, and those arising from the spinal marrow.

The nerves of the brain are nine pair. 1. The olfactory pair, which passing through the os cribrosum, are spread over the membrane of the nostrils. 2. The optick pair, which by their expansion form the retina of the eye. 3. The motory pair of the eyes, each of which is divided near the orbit, into six parts, or branches; of which, in human subjects, the first branch goes to the elevator palpebræ; the second, to the elevator of the eye; the third, to the depressor; the fourth, to the adducent; the fifth, to the inferior oblique muscle; and the sixth, into the tunicks of the eye: but, in other animals, they are divided much otherwise. 4. The pathetick pair of Willis, which are very small, and run to the trochlear muscle of the eye. 5. The gustatory pair, which are very large, and divided within the cranium into three branches immediately under the dura mater: of these the first branch, called the ophthalmick, runs to various parts of and about the eye, the eye-lids, the muscles of the forehead and nose, and the integuments of the face. The second branch may be called the superior maxillary one, as being finally distributed through all parts of the upper jaw, the lips, nose, palate, uvula, gums, teeth; a branch of it also runs to the ear, and joining with a branch of the seventh pair, forms the chorda tympani. The third branch may be called the maxillaris inferior, as being distributed over the several parts of the lower jaw, the tongue, and other parts of the mouth; whence the whole pair of nerves has obtained the name of par gustatorium; though a great part of them serves to very different purposes, and is carried to parts that have nothing to do with tasting. 6. The abducent pair, except a branch from the formation of the intercostal nerve, is wholly carried to the abducent muscle of the eye; whence its name. The intercostal nerve is formed either of ramifications of the two preceding nerves, or only of those of the sixth pair. It makes its way out of the cranium by the passage of the internal carotid, and descends near the eighth pair through the neck; and thence through the breast and abdomen, even to the pelvis; and, in its way, makes various plexuses and ganglia, and sends branches to almost all the parts contained in the breast and abdomen. 7. The auditory pair arise with two trunks; the one of which is called the portio dura, or hard portion; the other the portio mollis, or soft portion. This last enters the foramen of the os petrosum, and thence through various little apertures gets into the labyrinth of the ear, where it is expanded over all its parts, and constitutes the primary organ of hearing. The harder portion, passing the aquæduct of Fallopius, sends back one branch into the cavity of the cranium: it also sends off another branch which helps to form the chorda tympani; and others to the muscles of the tympanum. The rest of this pair goes to the external ear, the pericranium, the muscles of the os hyoides, the lips, the eye-lids, and the parotids. 8. The par vagum, with the accessorius of Willis, pass out near the laternal sinuses of the dura mater, and descending through the neck and thorax to the abdomen, send out branches by the way to the larynx, the pharynx, the heart, the lungs, and especially to the stomach. It also sends off from the upper part of the thorax, large branches, which are variously implicated in the neck, thorax, and abdomen, with the linguals, the cervicals, and the intercostals. 9. The lingual pair go immediately to the tongue, and are called by some the motory nerves of the tongue; but by others, with more justice, the gustatory nerves.

We are to observe, says Heister, that the pair of nerves, which the generality of writers have called the tenth pair of the head, are, for many unanswerable reasons, to be properly called the first pair of nerves of the neck.

Of the nerves which arise from the spinal marrow, there are properly thirty-two pair.

Those of the neck are no less than eight pair; and from them there are innumerable branches distributed through the muscles of the head, the neck, the scapula, and the humerus: from the third, fourth, and fifth pair are formed the nerves of the diaphragm; and the sixth, seventh, and eighth pair, together with the first pair of the back, form the six robust nerves of the arm and hands. To this division is the accessory spinal nerve of Willis to be referred, which arises about the origin of the third or fourth pair.

The nerves of the back are twelve pair, which, besides the branch they give to the brachial nerves, run entirely in the same furrow along the course of the ribs, and are dispersed over the pleura, the intercostal, pectoral, and abdominal muscles, the breast, and other parts of the thorax.

The nerves of the loins are five pair. These are in general dispersed over the loins, the peritonæum, and the integuments and muscles of the abdomen: and besides this, their first pair often gives, on each side, a branch to the diaphragm. The second pair after inosculating with the branches of the first, third, and fourth pair, forms the crural nerves, which are distributed over the anterior part of the thigh: and in the same manner a branch is formed of the conjunctions of the second, third, and fourth pair, which passes through the great foramen of the os pubis to the scrotum, the testicles, and the adjoining parts. The fourth and fifth pair of the

the nerves of the loins, joining with the firſt, ſecond, third, and fourth pair of the os ſacrum, compoſe the nerve called iſchiatick, which is the largeſt in the body; it deſcends along the hinder part of the thigh, and its branches are diſtributed over the whole leg, the foot, and toes

The nerves of the os ſacrum form five or ſix pair, though not always determinately and regularly ſo: they paſs through the foramina of this bone, and the ſuperior ones of them, as already obſerved, compoſe the iſchiatick nerve; and what remains is diſperſed, in a multitude of ramifications, over the parts contained in the pelvis, the inteſtinum rectum, the bladder, the parts of generation, and the parts adjacent.

NESTORIANS, a Chriſtian ſect, the followers of Neſtorius, biſhop and patriarch of Conſtantinople; who about the year 429, taught that there were two perſons in Jeſus Chriſt, the divine and the human, which are united, not hypoſtatically or ſubſtantially, but in a myſtical manner: whence he concluded, that Mary was the mother of Chriſt, and not the mother of God. For this opinion, Neſtorius was condemned and depoſed by the council of Epheſus; and the decree of this council was confirmed by the emperor Theodoſius, who baniſhed the biſhop to a monaſtery.

NET, or NEAT *Weight*, in commerce, the weight of a commodity, without the caſk, bag, caſe, or thing that contains it. It is alſo uſed to ſignify any thing pure, or unadulterated with any foreign mixture.

NET *Produce*, in commerce, what any commodity has yielded, the tare, &c. and all charges, being deducted.

NETE HYPEREOLEON, in the ancient muſick, the higheſt and moſt acute of the ſtrings of the lyre or the ancient ſcale.

NEURITICKS, *Nervines*, *Neuritica*, *Nervina*, in phyſick, are ſuch medicines as are proper for diſeaſes of the nerves and nervous parts, as the membranes, ligaments, &c.

NEUROGRAPHY, *Neurographia*, a deſcription of the nerves, with figures thereof engraved.

NEUROLOGY, *Neurologia*, an account or deſcription of the nerves, without any figures engraved of them.

NEUROTOMY, *Neurotomia*, an anatomical diſſection of the nerves.

NEUTER, denotes an indifferent perſon, who has eſpouſed neither party.

NEUTER, in grammar, a ſort of gender of nouns in the learned languages, which are neither maſculine nor feminine. There are no neuter nouns in Engliſh, and other modern tongues.

Verbs NEUTER, in grammar, ſuch verbs as are neither active nor paſſive, and govern nothing; having no object for the action expreſſed by the verb to fall upon, as, *he ſleeps, they yawn, we reſt*; &c.

Verbs neuter are divided into two ſorts; firſt, ſuch as denote a quality, ſituation, or ſome other attribute, &c. as *albet*, it is white, *ſedet*, he ſits, &c. And, ſecondly, thoſe verbs that ſignify actions which do not paſs into any ſubject different from the actor, as to dine, ſup, &c. But this latter kind ceaſe to be neuter, and become active, eſpecially in Greek and Latin, when a ſubject is given them, as, *vivere vitam*, &c. and, among the old French poets, *ſoupirer ſon tourment*; the Engliſh, To ſigh his woes, &c. But here ſomething is underſtood as, *vivere vitam beatam*, &c.

NEUTRAL SALTS, in chymiſtry, are a ſort of intermediate ſalts between acids and alcalies, participating of the nature of both, ſo that the one does not predominate over the other. Perfectly neutral ſalts are ſuch as produce no degree of efferveſcence, but become quite ſaturated upon the affuſion of any acid or alcaline liquor. The chief of this kind among the native ſalts are common ſalt, nitre, aphronitrum, the eſſential ſalts of plants, and thoſe obtained by boiling from ſome medicinal and acidulated ſprings. Thoſe prepared by art are the arcanum duplicatum, antimoniated nitre, Glauber's ſalt, and vitriolated tartar.

Salts of a temperate and neutral nature are not only of all others the moſt ſalutary, but alſo the ſafeſt and moſt efficacious, both for preventing and curing ſome of the diſorders incident to the human body.

NEUTRALITY, the ſtate of a perſon or thing that is neuter.

NEW MOON, *Neomenia*, that ſtate of the moon a little after her conjunction with the ſun. For the method of finding the time of new moon, ſee MOON.

NEWEL, in architecture, the upright poſt, with a pair of winding ſtairs turning about; being that part of the ſtair-caſe which ſuſtains the ſteps.

NEWTONIAN PHILOSOPHY, the doctrine of the laws, &c. of the univerſe, particularly of the heavenly bodies, as delivered by Sir Iſaac Newton.

The term Newtonian philoſophy is very differently applied; whence there have aroſe divers confuſed notions relating thereto. Some authors under this philoſophy include all the corpuſcular philoſophy, conſidered as it now ſtands corrected and reformed by the diſcoveries and improvements, in ſeveral parts thereof, by Sir Iſaac Newton. In this ſenſe it is that 'sGraveſande calls his elements of phyſicks, Introductio ad Philoſophiam Newtonianam. And in this ſenſe the Newtonian is the ſame with the new philoſophy, and ſtands contradiſtinguiſhed to the Carteſian, the Peripatetick, and the ancient corpuſcular.

Others, by Newtonian philoſophy, mean the method or order which Sir Iſaac Newton obſerves in philoſophizing, viz. the reaſoning, and drawing of concluſions directly from phænomena, excluſive of all previous hypotheſes; beginning from ſimple principles; deducing the firſt powers and laws of nature from a few ſelect phænomena, and then applying thoſe laws, &c. to account for other things. To this purpoſe the ſame 'sGraveſande explains himſelf in his Inſtitut. Newton. Philoſ. And in this ſenſe the Newtonian philoſophy is the ſame with the experimental philoſophy, and ſtands oppoſed to the ancient corpuſcular.

Others, by Newtonian philoſophy, mean that wherein phyſical bodies are conſidered mathematically, and where geometry and mechanicks are applied to the ſolution of phænomena; in which ſenſe, the Newtonian is the ſame with the mechanical and mathematical philoſophy.

Others again, by Newtonian philoſophy, underſtand that part of phyſical knowledge which Sir Iſaac Newton has handled, improved, and demonſtrated in his Principia.

Others, laſtly, by Newtonian philoſophy, mean the new principles which Sir Iſaac Newton has brought into philoſophy; the new ſyſtem founded thereon; and the new ſolution of phænomena thence deduced.

NICHE, in architecture, a cavity or hollow place, in the thickneſs of a wall for placing a figure or ſtatue.

NICOLAITANS, in church-hiſtory, Chriſtian hereticks who aſſumed this name from Nicolas of Antioch; who, being a Gentile by birth, firſt embraced Judaiſm, and then Chriſtianity; when his zeal and devotion recommended him to the church of Jeruſalem, by whom he was choſen one of the firſt deacons. Many of the primitive writers believe that Nicolas was rather the occaſion than the author of the infamous practices of thoſe who aſſumed his name, who were expreſſly condemned by the Spirit of God himſelf, Rev. ii. 6. And indeed their opinions and actions were highly extravagant and criminal. They allowed a community of wives: made no difference between ordinary meats and thoſe offered to idols: and told we know not what fables of the creation and diſpoſition of the world. According to Euſebius, they ſubſiſted but a ſhort time; but Tertullian ſays, that they only changed their name, and that their hereſies paſſed into the ſect of the Cainians.

NICOTIANA, *Tobacco*; ſo called from Nicot, the French ambaſſador at the court of Portugal, who firſt ſent it into France, in 1560, and gave it his own name, as he himſelf tells us in his dictionary. See TOBACCO

NICTITATING MEMBRANE, *Membrana nictitans*, in anatomy, a thin tranſparent membrane, particularly in birds and fiſhes, that covers their eyes and ſhelters them from duſt, or too much light. Hence the remarkable firmneſs of the eagle's ſight in viewing the ſun is readily accounted for, from this membrane being very cloſe and firm.

NIDUS, NEST, the repoſitory where fowls, inſects, reptiles, &c. lay their eggs, and wherein, when hatched, they nurſe their young till they can ſhift for themſelves.

NIECE, *Neptis*, a brother or ſiſter's daughter; which, in the civil law, is the third degree of conſanguinity, and, in the common law, the ſecond.

NIENT COMPRISE, in law, an exception taken to

petition

a petition as unjuſt, becauſe the thing deſired is not in that act or deed whereon the petition is grounded.

NIGHT, *Nox*, that part of the natural day wherein the ſun is not in our hemiſphere. Under the equator the nights are always equal to the days, and under the poles, the night holds half the year. The ancient Gauls and Germans, as appears from Tacitus and Cæſar; as alſo, the people of Iceland, the Arabs, and our Saxon anceſtors divided their time by the nights; hence our cuſtom of ſaying ſe'en-night, fortnight, &c.

NIGHTMARE, a popular name given to the diſeaſe called INCUBUS, which ſee.

NIHIL, *Nihilum*, *Nothing*, among the ſchoolmen, denotes what has no real eſſe, being conceived negatively, and expreſſed by a negative.

NIHILS, or NICHILS, iſſues which a ſheriff who is oppoſed in the Exchequer, ſays are nothing worth, and not to be levied, through the inſufficiency of the parties from whom the ſame are due.

NIMBUS, in antiquity, a circle obſerved on certain medals, or round the head of ſome emperors, anſwering to the circles of light, drawn around the images of ſaints. The nimbus is ſeen on the medals of Maurice, Phocas, and others, even of the upper empire.

NIPPERS, in the menage, are four teeth in the fore part of a horſe's mouth, two in the upper, and two in the lower jaw. A horſe puts them forth between the ſecond and third year.

NISI PRIUS, in law, a writ which lieth in caſes where the jury being impannelled and returned, before the juſtices of the Bank, one of the parties requeſts to have ſuch writ for the caſe of the county, whereby to will the ſheriff to cauſe the inqueſt to come before the juſtices in the ſame county at their coming thither. The effect of this writ of niſi prius is, that the ſheriff is hereby commanded to bring to Weſtminſter the men impannelled at a certain day, before the juſtices, niſi prius juſtic. dom. regis ad aſſiſas capiendas venerint, that is, unleſs the king's juſtices go before that day into ſuch a county to hold aſſizes.

NITRE, *Nitrum*, ſalt-petre, in natural hiſtory, a cryſtalline pellucid ſalt, ſomewhat whitiſh; in its moſt perfect pieces it is in form of long and ſlender cryſtals, of a priſmatick figure, of an equal thickneſs throughout their whole length; compoſed of ſix planes or ſides, and terminated at the end by a pyramid, ſmall and ſhort in proportion to the ſize of the column, but compoſed of the ſame number of planes: theſe ſhoots vaſtly reſemble the common ſpring cryſtals in the rocks. It is of an acrid and bitteriſh taſte, and impreſſes a peculiar ſenſe of coldneſs upon the tongue.

The earth from which nitre is made, both in Perſia and the E. Indies, is a kind of yellowiſh marl: it is found in the bare cliffs of the ſides of hills expoſed to the northern or eaſtern winds, and never in any other ſituation. The earth is light, crumbly, and friable; and though it be ſubject to accidental variations of colour from admixtures of other earths among it, and on this occaſion appears ſometimes blackiſh, rediſh, or whitiſh, yet its other qualities always diſtinguiſh it with ſufficient eaſe: it melts very freely in the mouth, and leaves a ſtrong taſte of ſalt-petre in it.

They collect large quantities of this earth, and, having prepared ſeveral pits, which they line with a firm and tough clay, they fill them half full of water, and throw into it large quantities of this earth; this ſoon moulders away to powder, they then add more water, and ſtir the whole thoroughly together; after which they let it ſtand four or five days: at the end of this time they open a hole in one of the ſides of the pit, and by means of a channel, cut to a proper depth and lined with the ſame clay, they let all the clear water run out of the firſt pit into another, which is prepared in a level ground, and is incloſed on all ſides, except the north-eaſt, by walls, but has no covering at the top. In this pit the action of the ſun and air by degrees evaporates the water, and the ſalt which it hath before waſhed out of the earth, now ſhoots into cryſtals about the ſides of the pit. Theſe cryſtals are ſmall and imperfect as well as impure. They are of the ſame hexaedral figure with the purer cryſtals of this ſalt, but they are uſually without the pyramids at the ends, and often too ſhort for their thickneſs. They are of a browniſh or duſky colour, and are in this ſtate ſent over to us. This is the rough nitre which we receive from the E. Indies. As the far greater part of the nitre, uſed in the world, is prepared in this manner, we are to ſuppoſe this kind of earth, which is found alſo in other countries, to be the true ore of nitre, though there are ſeveral very different ways of procuring it beſide.

In many places, the ruins of old buildings, where the walls are expoſed to the north-eaſt, and are defended from rain by being covered at top, ſhoot forth an efflореſcence of nitrous ſalt, cold and acrid to the taſte, and in all reſpects reſembling the common ſalt-petre: this effloreſcence is found much more abundantly in the eaſtern nations than any where elſe, and the uſe the people there make of it is this; they do not work it from nitre alone, but when their ſolution, made from the nitrous earth before deſcribed, will yield no more cryſtals, they then throw into the pit a quantity of theſe effloreſcences, and it immediately after yields a large quantity of cryſtals like the firſt. That this ſalt ſhould be found on the ſurface of walls is not wonderful, ſince it is found only on or near the ſurface of the earth where it is produced; they only cut away the marl for about a foot deep, to throw into the nitre-pits what remains underneath, this containing no nitre till it has been expoſed to the air a ſufficient time, and the ſame earth, where it is diſcovered at any thing more than a foot depth in digging, never being found to contain a grain of it.

Earths of whatever kind, moiſtened and penetrated by the dung and excrements of animals, frequently alſo afford nitre in large quantities. The earths at the bottom of pigeon-houſes, and thoſe of ſtable and cow-houſes, all afford nitre, on being thrown into water and boiled. In France, where very little nitre is imported, they make all that is uſed in their gunpowder works, &c. from the rubbiſh or old mortar of buildings, and the plaiſter with which their houſes abound. In fact, the mortar of old walls with us, if moiſtened with urine, and expoſed to the air in a proper ſituation, that is, open to the north-eaſt, and covered over to defend it from wet, never fails to afford nitre after a few weeks, and that often in no leſs a proportion than that of one tenth of the weight of the ingredients: finally, Hoffman affirms, that it may at any time be extracted from the air, by expoſing an alcaline ſalt to it in a proper ſituation, covered over-head from rains and dews.

There is no queſtion but a manufacture of nitre might be eſtabliſhed in England, to as much advantage as that of France; though, in the hands in which ſuch attempts have hitherto been, they have not ſucceeded. The place where the materials are expoſed, is a thing to be carefully examined: it muſt be moderate as to the great points of moiſture and dryneſs; if there be too much moiſture, the nitre which is already formed will be waſhed away; and on the other hand, without ſome moiſture, the ſalts will hardly be formed at all. Heat and cold, unleſs exceſſive, are of no uſe. It is in conſequence of the requiſiteneſs of ſo certain a degree of moiſture to the materials from which nitre is to be obtained, that the north-eaſt winds are of ſo much uſe in the production of it; in ſpring and autumn, which are the ſeaſons when this ſalt is principally made, theſe two winds are neither too moiſt nor too dry, eſpecially in the night; the ſouth and weſterly winds are deſtructive, becauſe of the ſtorms and ſhowers they almoſt continually bring with them.

The earths, from which nitre is procured in greateſt abundance, are found principally in Perſia, in China, in the E. Indies, and in Muſcovy; not that other parts of the world are without them, but in many they are diſregarded. This earth affords along with the nitre but a ſmall quantity of ſea ſalt, though there is always ſome of this with the other. The rubbiſh and earths we boil for it in Europe always afford a very large quantity of it; but they find ways of ſeparating a great deal of it, before they begin to ſhoot the nitre. When the lixivium of the nitrous earth has been boiled to a certain degree, they run it into proper veſſels, in which the ſea ſalt ſhoots into cubick grains at the bottom, before the nitre begins to form its cryſtals; they then drain off the liquor thus freed from a great part of this extraneous ſalt into other veſſels, in which it is left to ſhoot for the nitre in a cold place. When they have ſeparated all the cryſtals that are there found, they evaporate the liquor further and thence obtain more: at length they find a large quantity of

of an extremely acrid and bitter liquor, fat and oily to the touch, which will afford no more cryſtals; and this they call the mother water of ſalt-petre, becauſe, by ſprinkling it on other earths, they find it diſpoſes them for the production of more nitre. The cryſtals of nitre thus produced are far from the neceſſary purity, they require to be diſſolved and re-cryſtalized two or three times to bring them to the requiſite perfection; after which the French often melt them over the fire as they do our Engliſh alum, and, when a good part of the water is evaporated, they caſt the whole into caſks. This is what the French authors call rock or roach nitre.

Nitre promotes very much the fuſion of gold or ſilver, and is of no ill conſequence in the working thoſe metals; but as the ſulphurs of the other metals are not ſo intimately blended with their earths, as they are in theſe, it combines itſelf with them in the heating, and cauſes a detonation, by this means carrying off a very conſiderable portion of that ſulphur which was neceſſary to them as metals, and, in conſequence of that, robbing them of that metalline form, and reducing them to a ſort of calxes much more difficult of fuſion than before. This is eaſily experienced by throwing a mixture of equal parts of nitre, and of copper, iron, lead, or tin, into a red-hot crucible. Salt-petre is therefore to be very carefully avoided in all theſe proceſſes, unleſs firſt calcined itſelf, and burnt to an alcaline ſalt. In the manufactures it is of great uſe; beſides being the baſis of gunpowder, it is uſed in the making of white glaſs, and is of the ſame uſe with common ſalt in the preſerving of foods. In medicine it is cooling and diuretick, good in burning fevers, in which it is given with the ſeveral intentions of taking off the heat, quenching thirſt, and reſiſting putrefaction. Riverius ſpeaks of it as a diaphoretick, and many authors celebrate it as an anodyne; but theſe are intentions in which it is at preſent leſs received. The ancients had an opinion that the nitre was of a cauſtick nature: the latter writers, ſuppoſing ours the ſame, have attributed the ſame virtues and the ſame qualities to it, and, in conſequence of this error, have been inventing means of taking off the cauſticity, as they call it, of this ſalt, by burning it with ſulphur, and a thouſand other ways: but it is very certain, that purified nitre is better for all medicinal purpoſes than any of theſe idle preparations of it, when the ſalt is intended to be given on thoſe occaſions where its own ſimple nature is required.

Spirit of NITRE, *Spiritus Nitri*, in chymiſtry, is made in the following manner: Dry eighteen ounces of purified nitre, and reduce it to an impalpable powder: put it into a clean retort, and pour upon it ſix ounces of pure and highly rectified oil of vitriol; place the retort immediately in a ſand furnace, and apply a large receiver, luting the juncture with ſome Windſor loam; let the fire at firſt be very gentle, the receiver will nevertheleſs be full of white fumes, and a red liquor will come over in drops; increaſe the fire gradually till it riſes to the utmoſt heat a ſand furnace is capable of; then, when no more comes over, let all cool: have a bottle with a glaſs funnel ready in the mouth of it, and placed under a chimney; pour the liquor out of the receiver into it, avoiding the dangerous fumes, and ſtop it cloſe up for uſe. The receiver is to be ſtopped alſo, and reſerved for the ſame uſe another time. It will remain filled for many weeks with a red vapour, continually fluctuating and in motion. The ſpirit in the bottle will appear of a gold colour, and a red vapour will fill the ſpace over it. This liquor is the true and genuine ſpirit of the nitre alone; it contains nothing of the oil of vitriol that was uſed in the making of it, and the remainder of the nitre which did not come over in fumes, remains mixed with the acid in form of a denſe, white, and natural ſalt, ſomewhat reſembling the tartarum vitriolatum, and affording the nitrum vitriolatum hereafter to be mentioned. There is no method of ſeparating a ſtronger or purer ſpirit of nitre than this. Glauber was the inventor of this method, and he deſerves for it the honour of being acknowledged the inventor of one of the nobleſt diſcoveries that chymiſtry ever produced.

This ſpirit is one the ſtrongeſt menſtruums in chymiſtry. It diſſolves ſilver, and moſt of the other metals, and ſemi-metals, and even ſtones of all kinds, except thoſe which have cryſtals for their baſes; as is the caſe in our pebbles, and in the agates and onyx's of other countries; theſe are ſafe from the effects of all menſtrua, till the great deſideratum, a ſolvant for cryſtals, ſhall be found. Spirit of nitre does not touch gold: it gives a power of diſſolving ſilver to many other acids which before wanted it, as the ſpirit or oil of vitriol and of ſulphur; but it requires a mixture of ſea-ſalt to give it this power upon gold; with that mixture it becomes an aqua regia. This ſpirit is too corroſive to be given internally in its own form, but it furniſhes us with a very valuable medicine, under the name of a dulcified ſpirit of nitre.

Sweet Spirit of NITRE, *Spiritus Nitri dulcis.* Put into a large glaſs cucurbit a quart of highly rectified ſpirit of wine, and add to it, by a very little at a time, half a pound of the ſtrong ſpirit of nitre before deſcribed; when the whole quantity of the ſpirit of nitre is in, fit on a head, and, placing a cucurbit in ſand, diſtil over the liquor ſo long as what runs from the noſe of the head will not ferment with an alcali.

The caution required in mixing theſe two liquors is very great. There is ſcarce any mixture capable of ſuch ill conſequences; it emits a ſuffocating vapour, and will often burſt the veſſels by the heat and ebullition it raiſes, if done too haſtily. There immediately ariſes a fragrant ſmell on mixing the liquors, and the vapour that is raiſed from them is almoſt fiery. It is a very noble diuretick and carminative; it is given in the ſtone and gravel with great ſucceſs, and alſo in jaundices and dropſies. It is of great ſervice in reſtoring the appetite, when depraved by a mucous phlegm. It alſo allays thirſt. The doſe is from 15 to 30 drops in wine and water. Prudently uſed, it is excellent for cleaning the teeth, but, if made too free with, it deſtroys them.

Vitriolated NITRE, *Nitrum vitriolatum.* Diſſolve the maſs left in the retort after the diſtillation of ſpirit of nitre, in the manner above deſcribed, in about eight times its weight of water. Filtrate the ſolution, and, when perfectly clear, evaporate the liquor to ſuch a ſtandard, that the ſalt will no longer be ſuſtained in it; then ſet it in a cool place, and, as the ſalt ſhoots, collect it, and laying it in an earthen culinder to drain; when well dried, reſerve it for uſe. It is of much the ſame virtues with the tartarum vitriolatum, and is frequently ſold under its name.

NOBILITY, a quality that ennobles, and raiſes a perſon poſſeſſed of it above the rank of a commoner. The origin of nobility in Europe is by ſome referred to the Goths; who, after they had ſeized a part of Europe, rewarded their captains with titles of honour, to diſtinguiſh them from the common people. In Britain the term nobility is reſtrained to degrees of dignity above knighthood; but every where elſe nobility and gentility are the ſame. The Britiſh nobility conſiſts only of five degrees, viz. that of a duke, marquis, earl or count, viſcount, and baron, each of which ſee under their proper articles.

NOBLE, *Nobilis*, a perſon raiſed above a commoner or peaſant, either by birth, office, or patent.

NOBLE, denotes a money of account, equivalent to ſix ſhilling and eight pence. Formerly this was a real coin, and called roſe-noble.

NOCTAMBULI, *Noctambulones*, *Somnambuli*, ſuch perſons as riſe and walk about in their ſleep. The diſorder conſiſts in this, that the proper organs of muſcular motion are at liberty, while thoſe deſtined for ſenſation are bound up, or inactive. Certain ideas follow upon certain motions of the fibres of the brain, and certain motions of thoſe fibres upon certain ideas. Now, by much thinking on any one thing, the fibres acquire ſome permanent ſituation, which gives a freer paſſage to the ſpirits, towards a certain part of the body, than ordinary. If then the animal ſpirits become too copious, too much agitated, or conſiſt of parts too ſolid, they throw themſelves into the paſſages they find the moſt open, glide into the nerves and muſcles correſponding to theſe paſſages, and there produce the motions proper to thoſe muſcles. The bilious, melancholick, and ſanguine, are moſt ſubject to thoſe nocturnal vagaries.

The remedies are all ſuch things as temper the agitation of the ſpirits and relax the fibres, as bleeding, and all coolers, either internally or externally exhibited: aperitives too have a good effect; but the beſt remedy, according to ſome, is the cold bath.

NOCTI-

The New Complete Dictionary of Arts & Sciences, By The Revd. Wm. Middleton &c.

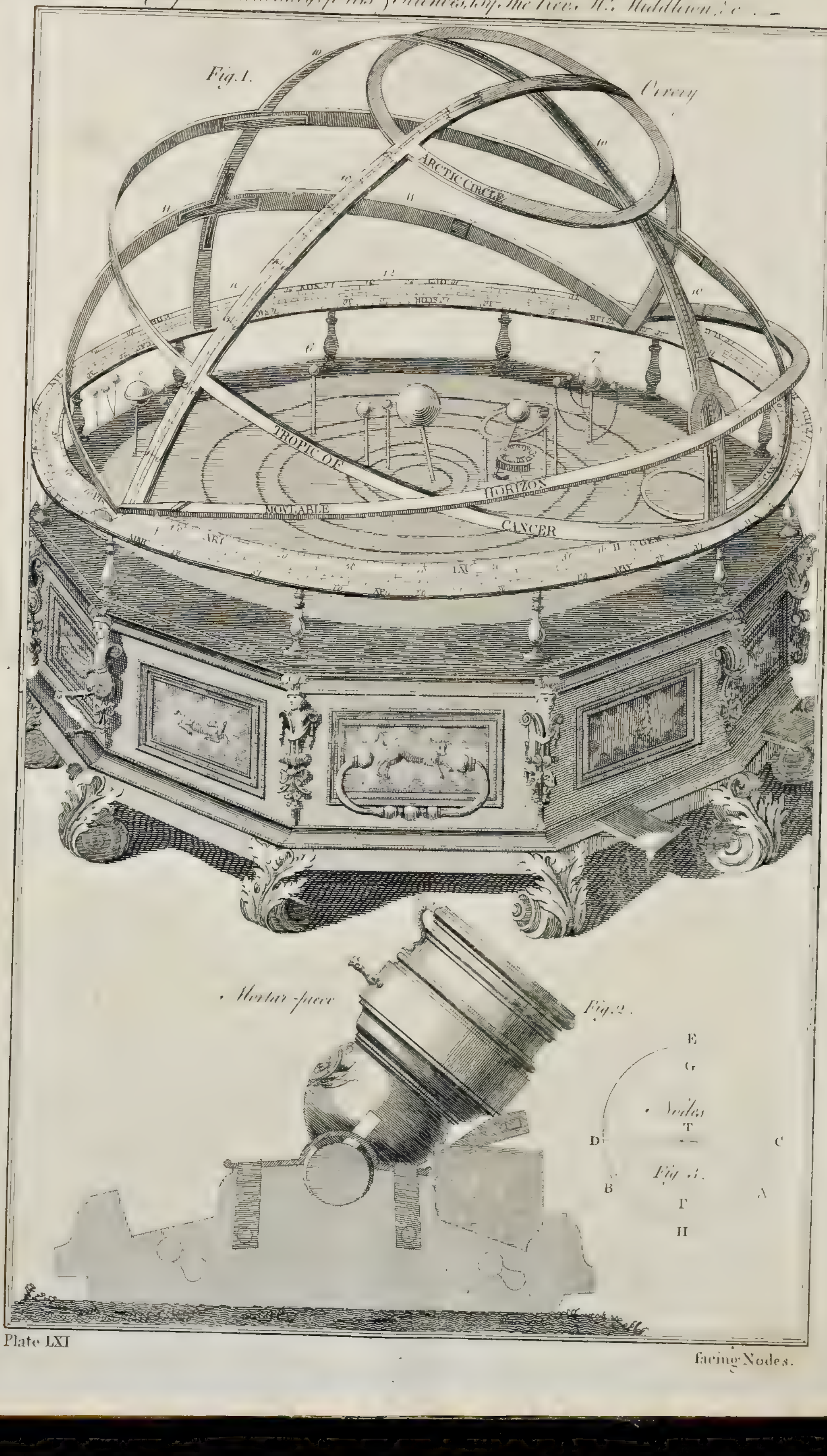

Plate LXI

facing Nodes.

NOCTILUCA, in natural hiftory, either denotes a glow-worm, or fpecies of phofphorus, fo called, becaufe it fhines in the night, without any light being thrown thereon, fuch as that made of urine: fo that it ftands contradiftinguifhed from the other fpecies, which muft be expofed to the fun-beams, before it fhine.

NOCTURNAL, fomething relating to the night, in contradiftinction to diurnal.

NOCTURNAL *Arch*, in aftronomy, the arch of a circle defcribed by the fun, or ftar in the night.

Semi-NOCTURNAL *Arch of the Sun*, that portion of a circle he paffes over between the lower part of our meridian and the point wherein he fets, or the point of the horizon wherein he rifes.

NOCTURNAL, *Noctulabium*, an inftrument chiefly ufed at fea to take the altitude or depreffion of fome ftars about the pole, in order to find the latitude and hour of the night. Some nocturnals are hemifpheres or planifpheres on the plane of the equinoctial. Thofe commonly in ufe among feamen are two; the one adapted to the pole-ftar, and the firft of the guards of the little bear; the other to the pole-ftar, and pointers of the great bear.

Conftruction of the NOCTURNAL. This inftrument confifts of two circular plates applied to each other. The greater, which has a handle to hold the inftrument, is about two and a half inches diameter, and is divided into 12 parts, anfwering to the 12 months; and each month fubdivided into every fifth day; fo that the middle of the handle correfponds to that part of the year, wherein the ftar here regarded has the fame right afcenfion with the fun. In the centre of the two circular plates is adjufted a long index, moveable upon the upper plate; and the three pieces, viz. the two circles and the index, are joined by a rivet which is pierced through the centre, with a hole through which the ftar is to be obferved.

Ufe of the NOCTURNAL. Turn the upper plate till the longeft tooth, marked 12, be againft the day of the month on the under plate; then, bringing the inftrument near the eye, fufpend it by the handle, with the plane nearly parallel to the equinoctial, and, viewing the pole-ftar through the hole of the centre, turn the index about, till, by the fiducial edge, you fee the bright ftar or guard of the little bear (if the inftrument be made for that ftar:) then that tooth of the upper circle, under the edge of the index, gives the hour of the night on the hour circle.

NODATED HYPERBOLA, a kind of hyperbola, which, in turning round, decuffates or croffes itfelf.

NODE, *Nodus*, *Exoftofis*, in furgery, a difeafe or tumour in the bones, ufually arifing from fome venereal caufe. To fuch tumours are frequently applied leaden plates covered with mercury, as alfo other mercurial preparations are ufed to refolve them.

NODE, or *Tophus*, more particularly denotes protuberances arifing on the joints of old gouty perfons.

NODES, in aftronomy, the two points where the orbit of a planet interfects the ecliptick. Such are the two points C and D (*plate* LXI. *fig.* 3.) whereof the node C, where the planet afcends northward above the plane of the ecliptick, is called the afcending node, or the dragon's head, and is marked thus ☊. The other node, D, where the planet defcends to the fouth, is called the defcending node, or the dragon's tail, marked thus ☋. And the right line, DC, is called the line of the nodes.

NODOSA, in furgery, denotes a kind of future, as alfo various bandages.

NODULUS, NODULE, in pharmacy, a knot tied on a bag, containing fome medicinal ingredients, with which the liquor this nodulus is fufpended in, is to be impregnated. It alfo denotes the bag itfelf.

NODUS, NODE, in dialling, a hole in the gnomon of a dial, in a cieling, window, &c. by the light of which, either the hour of the day in dials without furniture, or the parallels of the fun's declination, and his place in the ecliptick, &c. in thofe with furniture, are fhewn.

NOETIANS, in church hiftory, Chriftian hereticks in the third century, followers of Noetius, a philofopher of Ephefus, who pretended that he was another Mofes, fent by God; and that his brother was a new Aaron: his herefy confifted in affirming that there was but one perfon in the godhead; and that the Word and the holy Spirit were but external denominations given to God, in confequence of different operations; that as creator, he is called Father; as incarnate, Son; and as defcending on the apoftles, holy Ghoft.

NOLI ME TANGERE, *Touch me not*, in medicine, a malignant eruption in the face, occafioned by an extremely fharp corrofive humour; thus called, either becaufe it affects thofe who touch it, or becaufe the more it is touched, the worfe it grows, and the further it fpreads.

NOMADES, in antiquity, a name given to feveral nations or people, whofe whole occupation was to feed their flocks, and who had no fixed place of abode, but were conftantly fhifting, according to the conveniencies of pafturage.

NOMANCY, a name given to the art of divining the fates of perfons, by means of the letters that form their names; being nothing elfe but the cabbaliftick gematria.

NOMBRIL POINT, in heraldry, is the next below the fefs point or the very centre of the efcutcheon. See the article POINT.

NOME, or NAME, in algebra, denotes any quantity with a fign prefixed or added to it, whereby it is connected with fome other quantity, upon which the whole becomes a binomial, trinomial, or the like: thus $a+b$ is a binomial, $a+b+c$ is a trinomial, whofe refpective names or nomes are a and b for the firft, and a, b, and c, for the fecond. See the article BINOMIAL, &c.

NOMENCLATURE, *Nomenclatura*, a catalogue of feveral of the more ufual words in any language, with their fignifications, compiled in order to facilitate the ufe of fuch words to thofe who are to learn the tongue: fuch are our Latin, Greek, French, &c. nomenclatures.

NOMINALISTS, NOMINALS, a fect of fchool-philofophers, followers of Ocham, an Englifh cordelier, in the fourteenth century, fo called, in oppofition to the realifts, as maintaining that words, not things, were the object of dialecticks. They founded the univerfity of Leipfick, and they, with the ftoicks, admit the formal ideas of things, as the foundation of univerfality; but to this they add names, which fignify, without any diftinction, a great variety of fingle things alike in genus and fpecies.

NOMINATION, *Nominatio*, the appointing a perfon to fome function or benefice. In common law, there is a difference between nomination and prefentation; the former being a power which a man has by virtue of a manor, &c. to name a clerk to a patron of a benefice, to be by him prefented to the ordinary.

NOMINATIVE, in grammar, the firft cafe of declinable nouns, being properly the ground whence the other cafes in the learned languages, &c. are to be formed by the feveral inflexions given to this firft termination. It is placed before all verbs, as the fubject of the affirmation or propofition, as, Petrus negavit Dominum, Peter denied the Lord, &c.

NONAGE, in law, an incapacity of doing fome things for want of proper age.

In matters of inheritance, a man is in his nonage till 21 years of age; and for marriage, till 14, &c.

NONAGESIMAL, in aftronomy, the nineteenth degree of the ecliptick reckoned from its eaftern point. The altitude of the nonagefimal is equal to the angle of the eaft; and, if continued, paffes through the poles of the ecliptick. Hence the altitude of the nonagefimal, at a given time, under a given elevation of the pole, is eafily found. If the altitude of the nonagefimal be fubtracted from 90°, the remainder is the diftance of the nonagefimal from the vertex.

NONABILITY, in law, incapacity, or an exception taken againft a plaintiff in a caufe, on fome juft ground why he cannot commence a fuit in law; as his being attainted of felony, outlawry, &c.

NONAPPEARANCE, a default in not appearing in a court of judicature. Attornies fubfcribing warrants for appearing in court, are liable to attachment and fine for non-appearance. If a defendant does not appear, and find bail upon a fcire facias and rule given, judgment may be had againft him.

NONCOMPOS *Mentis*, in law, is ufed to denote a perfon's not being of found memory and underftanding. Of thefe perfons there are four different kinds, an ideot, a madman, a lunatick who has lucid intervals, and a drunkard

drunkard who deprives himſelf of reaſon by his own act and deed. In all theſe caſes, except the laſt, one that is non compos mentis ſhall not loſe his life for felony or murder; but the drunkard can have no indulgence on account of the loſs of his reaſon, for, in the eye of the law, his drunkenneſs does not extenuate but aggravate his offence.

NON-NATURALS, in medicine, ſo called becauſe by their abuſe they become the cauſes of diſeaſes. See DISEASE.

Phyſicians have divided the non-naturals into ſix claſſes, viz. the air, meats and drinks, ſleep and watching, motion and reſt, the paſſions of the mind, the retentions and excretions, &c. which ſee.

NON-RESIDENCE is particularly applied to ſpiritual perſons, who wilfully abſent themſelves for the ſpace of one month together, or two months at different times in the year, from their benefices; for which they are liable to penalties, by the ſtatute of non-reſidence: but biſhops, the king's chaplains, &c. are excepted.

NON-SUIT, ſignifies the dropping of a ſuit or action, or a renouncing thereof by the plaintiff or defendant, which happens moſt commonly upon the diſcovery of ſome error in the plaintiff's proceedings, when the cauſe is ſo far proceeded in, that the jury is ready at the bar to deliver in their verdict.

A non-ſuit, it is ſaid, may be in the following caſes, viz. where a perſon brings a perſonal action, and does not proſecute it with effect; or if, upon the trial, he refuſes to ſtand a verdict, then he becomes non-ſuited; ſo where the plaintiff is not ready for trial at the calling and ſwearing of the jury, it is preſumed he does not ſtand to proceed in his cauſe, and on that account the court may call him non-ſuited. Likewiſe, on a trial, when the jury comes in to deliver their verdict, and when the plaintiff is called on to hear the ſame, in that caſe, if he does not appear after being thrice called by the crier of the court, he is non-ſuited; which non-ſuit is to be recorded by the ſecondary, by the direction of the court: but if he afterwards appears, before the non-ſuit is actually recorded, the court may take the verdict, for that is not a non-ſuit, till it be recorded, upon motion made by the counſel for this purpoſe; and then it is a part of the record, in the nature of a judgment againſt the plaintiff.

NONE, one of the ſeven canonical hours in the Romiſh church, anſwering to three o'clock in the afternoon.

NONES, *Nonæ*, in the Roman calendar, the fifth day of the months January, February, April, June, Auguſt, September, November, and December; and the ſeventh of March, July, and October. March, May, July, and October, had ſix days in their nones; becauſe theſe alone, in the ancient conſtitution of the year by Numa, had 31 days a-piece, the reſt having only 29, and February 30; but when Cæſar reformed the year, and made other months contain 31 days, he did not allot them ſix days of nones.

NORMAL-LINE, in geometry, is uſed for a perpendicular line, drawn to a tangent of a curve from the point of contact, and intercepted by the axis thereof. See PERPENDICULAR and SUBNORMAL.

NORROY, the title of the third of the three kings at arms.

NORTH, in coſmography, one of the four cardinal points. See COMPASS.

NORTHING, in navigation, the latitude made by a ſhip, in ſailing towards the north-pole.

NOTARY, *Notarius*, primarily denotes one who takes ſhort draughts or minutes of contracts or other inſtruments; particularly an officer who takes notes of obligations, &c. executed before him, and delivers out authentick copies thereof. Notaries are now little known among us, except in mercantile affairs, though in France, Scotland, &c. they ſtill ſubſiſt in their legal capacity. The notaries of the chatelet are called the king's counſellors and note-keepers.

NOTARY *Publick*, in commerce, a perſon among us who draws and publickly atteſts deeds, charter-parties, or writings between merchants, to make them authentick in other countries. In their books are regiſtered proteſts, remonſtrances, &c.

NOTATION, *Notatio*, is that part of arithmetick which explains the method of writing down, by characters or ſymbols, any number expreſſed in words; as alſo the way of reading or expreſſing, in words, any number given in characters or ſymbols. But the firſt of theſe is properly notation, and the laſt is more uſually called *numeration*.

NOTATION, in algebra, the repreſenting quantities by letters of the alphabet, or calling them by thoſe names.

NOTE, *Nota*, denotes a character or abbreviature, ſerving to expreſs ſomething in a little compaſs.

NOTES, in muſick, are characters which mark the tones, that is, the riſing or falling of the voice and ſound, and the ſwiftneſs or ſlowneſs of its motions. See CHARACTERS *in Muſick*.

NOTE, ſignifies a mark made in a book, &c. where ſomething remarkable occurs, as alſo an explication of ſome paſſage in an author, ſubjoined thereto; in which ſenſe note ſtands contradiſtinguiſhed from text.

NOTE, is alſo a minute containing ſome article of buſineſs, as a promiſſory note, &c.

To NOTE *a Bill*, when a publick notary goes as a witneſs that a merchant will not accept or pay it.

NOTE *of a Fine*, a brief made thereof by the chirographer before it be engroſſed.

NOTHÆ COSTÆ, in anatomy, the ſpurious ribs. See RIBS.

NOTHUS, properly denotes a perſon of ſpurious birth; hence, it is figuratively applied, in phyſick, to diſeaſes, which, though of the ſame denomination with ſome others in reſpect of a ſimilitude of ſymptoms, &c. are of a different origin, or ſeat, from them.

NOTION, *Notio*, in logick, an idea of any thing in the mind.

NOTITIA, *Notice*, ſomething that has fallen under a perſon's knowledge or obſervation: hence notification, the action of giving notice. It is alſo the title of certain books, in order to give a particular knowledge of the places, roads, &c. of a province, kingdom, &c. Such is the Notitia imperii, M. Valois's Notitia Galliarum, the Notitia dignitatum imperii, both eaſtern and weſtern, &c.

NOTORIOUS, ſomething known and publick.

NOVALE, in our ancient cuſtoms, land newly ploughed which had not been tilled within the memory of man before. It alſo denotes fallow land, that is, land which has been ploughed for two years, and reſts one more, or that lies fallow every other year.

NOVATION, *Innovation*, in the civil law, a change or alteration of an obligation, whereby it becomes extinguiſhed. There are two kinds; the one voluntary, the other neceſſary and conſtrained.

Voluntary NOVATION, when there is a will to innovate; and this is done three ways, namely, by changing the cauſe of the obligation, without the intervention of any other perſon; by changing the nature of the obligation; and by delegation, as when a debtor makes over a debt to a creditor for his ſatisfaction.

Neceſſary NOVATION, that made in conſequence of a ſentence or decree of juſtice.

NOVATIANS, a Chriſtian ſect which ſprang up in the third century, ſo called from Novatian, a prieſt of Rome, or Novatus, an African biſhop, who ſeparated from pope Cornelius, whom Novatian charged with a criminal lenity towards thoſe who had apoſtatized during the perſecution of Decius. He denied the church's power of remitting mortal ſins, upon the offender's repentance; and at laſt went ſo far as to deny that the apoſtles could ever hope for pardon even from God himſelf.

NOVEL, *Novella*, in juriſprudence, denotes the conſtitutions of ſeveral emperors, particularly Juſtinian's, moſt of whoſe novels were originally Greek, and afterwards tranſlated into Latin. They were called novel, as being made on new caſes not yet conſidered.

NOVEL *Aſſignment*, in an action of treſpaſs, an aſſignment of time, place, &c. in a declaration, otherwiſe, or more particularly than it was in the writ.

NOVEMBER, the ninth month of the year, reckoning from March; and hence comes its name.

NOVEMSILES, in mythology, the gods of the Sabines, adopted by Romulus, and a temple built to them, in conſequence of a vow made by king Tatius.

NOVEMVIRI, in antiquity, the chief magiſtrates at Athens, being nine in number, their head was called

Archon,

Archon, whose name was recorded in the Athenian feasts, as that of the consul at Rome.

NOVENDIAL *Novendiale*, in antiquity, a solemn sacrifice among the Romans, when any prodigies appeared to menace them with ill fortune.

NOVICE, any person unexperienced in an art or profession. In the Roman armies, Novitii were the young raw soldiers, contradistinguished from the veterans.

NOUN, *Nomen*, in grammar, a name or word expressing the thing spoken of, as king, queen, prince, &c. Besides the particular name which each person bears, he gives himself another when he speaks of himself, as I or myself; the former are called nouns, and the latter pronouns.

Nouns are again divided into nouns substantive, and nouns adjective. They are called substantives when the objects they express are considered simply in themselves, as soul, &c. and adjectives, when their objects are considered as clothed with any qualities, as a vicious soul, &c.

Nouns are also divided into proper and appellative; Nouns proper are those which express a particular thing or person, so as to distinguish it from all others of the same kind, as Aristotle, &c. Nouns appellative, are those common to several individuals of the same kind, as man, beast, fish, &c.

Heterogeneous NOUNS, such nouns as are of one gender in the singular number, and of another in the plural.

NOWE, NOWED, knotted, in heraldry, the tails of such animals as are very long, and represented in a coat as if tied up in a knot.

NUBECULA, a little cloud, in medicine, denotes either a kind of pendulous cloud or sediment floating in the middle of the urine, and called enæorema, or a disorder in the eye, the same with albugo.

NUCHA, the back or nape of the neck, properly the region upon the first vertebra of the back.

NUCIFEROUS, in botany, is applied to such trees as bear nuts.

NUCKIANÆ GLANDULÆ, in anatomy, a number of small glands between the abducent muscle of the eye and the upper part of the os jugale, so called from the inventor, Ant. Nuck, professor of physick at Leyden. The same author gave his name to a salival duct, ductus Nuckianus.

NUCLEUS, literally denotes the kernel of a nut or stone fruit, or more generally any seed contained within a husk.

NUCLEUS, according to some astronomers, denotes the body or head of a comet, in contradistinction to its beard or tail.

NUCLEUS, in architecture, the middle part of the flooring among the ancients, consisting of a strong cement over which the pavement was laid bound with mortar.

NUDITIES, in painting and sculpture, the parts of a human figure not covered with drapery.

NULLITY, the quality of a thing whereby it is void and of no effect, because of something contrary to law, custom, or form. There are two kinds of nullities, de facto, and de jure; the former where the thing becomes null ipso facto, as soon as it is proved; in the latter the act does not immediately become null, but occasion is thereby given to have it entirely set aside.

NUMBER, *Numerus*, in arithmetick, an assemblage of several units, or things of the same kind.

Stevinus defines number as that by which the quantity of any thing is expressed; agreeably to which, Sir Isaac Newton conceives number to consist in the abstract ratio of a quantity of any kind to another quantity of the same kind which is accounted as unity: and on this view he divides number into integers, fractions, and surds.

Wolfius defines number to be something which refers to unity, as one right line refers to another. Thus assuming a right line for unity, a number may likewise be expressed by a right line. A less general definition will not, he thinks, comprehend the several kinds of whole numbers, fractions, rationals, and surds. Mathematicians, considering number under a great many relations, make many kinds.

A determinate NUMBER, is that referred to some given unit, as a ternary or three.

Indeterminate NUMBER, is that referred to unity in the general, and is what is called quantity.

Homogeneal NUMBERS, are those referred to the same unit.

Heterogeneal NUMBERS, those referred to different units.

Whole NUMBERS, *natural Numbers*, or *Integers*, are all the various assemblages of unity; or, according to Wolfius, all those, which, in the manner of expressing, refer to unity, as a whole does to a part.

Broken NUMBERS, or *Fractions*, are those consisting of several parts of unity, or those which refer to unity, as a part to the whole.

Rational NUMBER, is that commensurable with unity. Rational whole number, is that whereof unity is an aliquot part. Rational broken number, that equal to some aliquot part of unity. Rational mixed number, that consisting of a whole number and a broken one.

Irrational NUMBER, or *Surd*, a number incommensurable with unity.

Even NUMBER, that which may be divided into two equal parts without any fraction, as 6, 12, &c. The sum, difference, and product of any number of even numbers, is always an even number.

An evenly even NUMBER, is that which may be measured, or divided, without any remainder, by another even number, as 4 by 2.

An unevenly even NUMBER, when a number may be equally divided by an uneven number, as 20 by 5.

Uneven NUMBER, that which exceeds an even number, at least by unity, or which cannot be divided into two equal parts, as 3, 5, &c. The sum or difference of two uneven numbers makes an even number; but the factum of two uneven ones makes an uneven number. If an even number be added to an uneven one, or if the one be subtracted from the other, in the former case the sum, in the latter the difference, is an uneven number; but the factum of an even and uneven number is even. The sum of any even number of uneven numbers is an even number, and the sum of any uneven number of uneven numbers is an uneven number.

Primitive, or *prime* NUMBERS, are those only divisible by unity, as 5, 7, &c. And prime numbers among themselves, are those which have no common measure besides unity, as 12 and 19.

Compound NUMBER, is that divisible by some other number besides unity, as 8, which is divisible by 4 and 2. Compound numbers, among themselves, are those which have some common measure besides unity, as 12 and 15.

Perfect NUMBER, that, whose aliquot parts, added together, make the whole number, as 6, 28; the aliquot parts of 6 being 3, 2, and $1=6$; and those of 28, being 14, 7, 4, 2, $1,=28$.

Imperfect NUMBERS, those whose aliquot parts, added together, make either more or less than the whole. And these are distinguished into abundant and defective; an instance in the former case is 12, whose aliquot parts, 6, 4, 3, 2, 1, make 16; and in the latter case 16, whose aliquot parts, 8, 4, 2, and 1, make but 15.

Plain NUMBER, that arising from the multiplication of two numbers, as 6, which is the product of 3 by 2; and these numbers are called the sides of the plane.

Square NUMBER, is the product of any number multiplied by itself; thus 4, which is the factum of 2 by 2, is a square number. Every square number added to its root makes an even number.

Cubick NUMBER, is the product of a square number multiplied by its root, as 8 is the product of the square number 4, multiplied by its root 2.

All cubick numbers whose root is less than 6, as 8, 27, 64, 125, being divided by 6, the remainder is the root itself. 216, the cube of 6, being divided by 6, leaves no remainder; 343, the cube of 7, leaves a remainder 1, which, added to 6, is the cube root of 343; and 512, the cube of 8, divided by 6, leaves 2, which, added to 6, is the cube root. So that the remainders of the divisions of the cubes above 216, divided by 6, being added to 6, always give the root of the cube divided, till that remainder be 5, and consequently 11 the cube root of the number divided. But, the cubick number above this being divided by 6, there remains nothing, the cube root being 12. Thus the remainder of the higher cubes are to be added to 12, and not to 6, and, coming to the

cube of 18, the remainder of the division must be added thereto, and not to 6. And so in infinitum.

M. De la Hire, considering this property of 6, with regard to cubick numbers, found that all other numbers, raised to any power whatever, had each their divisor, which had the same effect with regard to them, as 6 has to cubes. And the general rule is this, if the exponent of the power of a number be even, that is, if it be raised to the 2^d, 4^{th}, 6^{th}, &c. power, it must be divided by 2, and the remainder, if any, added to 2, or to a multiple of 2, gives the root of the number corresponding to its power. But if the exponent of the power of the number be uneven, namely, the 3^d, 5^{th}, 7^{th}, &c. power, the duple of that exponent will be the divisor.

Polygonous NUMBERS; the sums of arithmetical progressions beginning with unity: these, where the common difference is 1, are called triangular numbers; where 2, square numbers; where 3, pentagonal numbers; where 4, hexagonal numbers; where 5, heptagonal numbers.

Pyramidal NUMBERS, the sums of polygonous numbers, collected after the same manner as the polygons themselves, are not gathered out of arithmetical progressions, are called first pyramidal numbers: the sums of the first pyramidals are called second pyramidals, &c. If they arise out of triangular numbers, they are called triangular pyramidal numbers; if out of pentagons, first pentagonal pyramidals.

Cardinal NUMBERS, are those which express the quantity of units, as 1, 2, 3, &c.

Ordinal NUMBERS, those which express their order, as the 1^{st}, 2^d, 3^d, &c.

Golden NUMBER. See CYCLE *of the Moon*.

NUMBER, in grammar, is a modification of nouns, verbs, &c. to accommodate them to the varieties in their objects, with regard to number.

When a noun denotes an object considered as singly or alone, or a number of them considered as united together, it is said to be of the singular number, as a tree, a troop, &c. When it indicates several objects, and those as distinct, it is of the plural number, as trees, &c.

The Greeks have a 3^d number, which they call the dual number, as signifying two. The Hebrews have something like it, when the words signify a thing double, either by nature, as the hands, &c. or by art, as tongs, &c. Common and appellative names seem all naturally to require a plural number; yet there are several which have none, as gold, silver, &c.

The difference of numbers in nouns is expressed by a difference of termination; and in English the singular is usually converted into the plural by adding *s*: where the singular ends in *s*, *x*, *sh*, or *ch*, it is usually done by the addition of *es* instead of *s*.

In English the plurals of adjectives, though varied from the singulars in most other languages, are generally the same.

NUMBERS, in poetry, oratory, musick, &c. are certain measures, proportions, or cadences, which render a verse, period, or song, agreeable to the ear.

Poetical NUMBERS consist in a certain harmony, as to the order, quantity, &c. of the feet and syllables, which make the piece musical to the ear, and fit for singing; for which all the verses of the ancients were intended. The numbers are what constitute the air and character of a verse, and hence it is denominated smooth or soft, low, rough, or sonorous.

Rhetorical, or *prosaick* NUMBERS, are a sort of simple, unaffected harmony, less glaring than that of verse, yet such as affects the mind with pleasure.

Numbers are absolutely necessary in all writing, and even all speech. Hence Aristotle, Tully, Quintilian, &c. lay down abundance of rules, as to the best manner of intermixing dactyls, spondees, anapests, iambus's, &c. in order to have the numbers perfect.

The style, say they, becomes numerous by the alternate disposition and temperature of long and short syllables; thus Tully to Cæsar, Domuisti gentes immanitate barbaras, multitudine innumerabiles, locis infinitas, omni copiarum genere abundantes, &c. Sometimes indeed long or short syllables are designedly thrown together without any such mixture, to paint the celerity or slowness of a thing by that of the numbers, as,

Quadrupedante putrem sonitu quatit ungula campum.
ÆN. l. 8.

The style becomes numerous by the intermixing words of one, two, and more syllables: whereas the too frequent repetition of monosyllables renders the style pitiful and grating.

It contributes greatly to the numerousness of a period to have it closed by magnificent and well sounding words; and not only so, but in the whole tenour of the period.

To have the period flow easily and equally, the harsh concurrence of letters and words is to be studiously avoided, particularly the frequent meeting of rough consonants.

Lastly, the utmost care is to be taken, lest, in aiming at oratorial numbers, you fall into poetical ones, which even Cicero himself is sometimes guilty of, as, Cum loquitur, tanti fletus gemitusque fiebant.

NUMERAL LETTERS, those letters of the alphabet which are generally used for figures, as I, V, X, L, C, D, M.

NUMERALS, in grammar, such words as express numbers, as six, eight, ten, &c.

NUMERATION, *Numeratio*, in arithmetick, the art of estimating or pronouncing any number.

The characters whereby numbers are ordinarily expressed are the nine following, 1, 2, 3, 4, 5, 6, 7, 8, 9.

That these nine numerical notes may express not only units, but also tens, hundreds, thousands, &c. they have a local value given them; so that when either alone, or when placed in the right-hand place, they denote units; in the second place, tens; in the third, hundreds; in the fourth, thousands. To express any number, it is to be divided by commas into classes, allowing three characters for each, and beginning at the right-hand. Over the right-hand figure of the third class add a small mark, over the right-hand figure of the fifth class add two marks, over that of the seventh, three, &c. The number to the left of the first comma express by thousands; that which has over it the first transverse line express by millions; that which has two by billions; that with three by trillions, &c. Lastly, the left-hand character of each class express by hundreds; the middle one by tens; and the right-hand one by units. For instance, 2‴ 345, 389″, 210 762′, 321 543, is thus read, two trillions, three hundred and forty-five thousand, three hundred eighty-nine billions, two hundred and ten thousand, seven hundred and sixty-two millions, three hundred and twenty-one thousand, five hundred and forty-three.

NUMERATOR, in fractions, denotes how many of those parts into which the integer is supposed to be divided, are to be taken, and which is placed a-top of the little bar, by which it is separated from the under number, called the denominator, which shews into how many parts the integer is divided, as $\frac{3}{10}$ or three tenths, &c.

NUMERICAL, NUMEROUS, NUMERAL, something relating to numbers.

NUMERICAL *Algebra*, that which makes use of numbers instead of letters of the alphabet.

NUMERICAL *Difference*, the difference whereby one individual is distinguished from another.

NUMERO, in commerce, &c. a term prefixed to any number of things.

NUMISMATOGRAPHY, the description of ancient medals and coins.

NUMMUS, *Nummus*, in antiquity, a piece of money among the Romans, otherwise called sestertius.

NUN, a female religious.

NUNNERY, a monastery of female religious.

NUNCIO, *Nuntio*, an ambassador from the pope to some catholick prince, or state; being of the same import with ambassador from other princes. An internuncio denotes an ambassador extraordinary from the pope. The pope's nuncio may delegate judges in all the states where he resides, except in France, where he is only a simple ambassador.

NUNCUPATIVE, in the schools, expresses something that is only nominal.

NUNCUPATIVE *Will*, a last will that is only made verbally, and not put into writing.

NUNDINAL, *Nundinalis*, in antiquity, denotes the eight first letters of the alphabet, which the Romans used in the calendar, namely, A, B, C, D, E, F, G, H, which are repeated successively from the first to the last day

day of the year. One of theſe always expreſſed the market-days, or aſſemblies, called nundinæ, or novemdinæ, as returning every nine days; when the country people, after working eight days ſucceſſively, came to town the ninth to ſell their commodities, &c. Theſe nundinals bear a good deal of reſemblance to the dominical letters, which return every eighth day.

NUPER OBIT, in law, a writ which lies for a coheireſs, being deforced by her coparcerner of lands or tenements, whereof their common anceſtor died ſeized in fee ſimple. If he died in fee tail, the coheireſs deforced ſhall have a formedon.

NUPTIAL, ſomething relating to marriage.

NURSERY, in gardening, a ſeminary for raiſing young trees. Mr. Lawrence recommends the having ſeveral nurſeries for the ſeveral kinds of trees.

The nurſery for ſtandards ſhould be in a rich light ſoil, ſown with proper ſeed in October or November. Crab and wild pear kernels are to be preſerved for ſtocks for apples and pears. Elms and limes are to be raiſed from planted ſuckers: walnuts are to be ſown with the green ſhell on to preſerve them from mice. If this nurſery be well managed and weeded, for two years, the plants will be fit for grafting and inoculating the third year. Firs and pines are to be raiſed from thoſe little ſeeds taken out of their apples. For apricots and peaches, ſow the ſtones of the pear-plumb, muſſel, or bonum magnum plumb, which prove better and more laſting than the ſtones of apricots and peaches. The black cherry ſtones do the beſt for all ſorts of cherries.

Mr. Mortimer directs all ſtone fruit to be ſown quickly after gathering; for that, if they be kept, they will be two years before they come up. And, if they have not the winter moiſture to rot the ſhells, the kernel will ſcarce come up at all. The ſeeds of yew, holly, juniper, &c. are to be put in ſo many diſtinct pots, with fine mould over them, and thus buried for a year; after which they are to be taken out and ſown.

NUSANCE, *Nocumentum*, in law, denotes not only a thing done to the hurt of another, in his fee lands or tenements, but likewiſe the writ lying for the ſame.

Nuſances are either publick or private: a publick nuſance is an offence againſt the publick in general, either by doing what tends to the annoyance of all the king's ſubjects, or by neglecting to do what the common good requires; in which caſe all annoyances and injuries to ſtreets, highways, bridges, and large rivers; as alſo diſorderly ale-houſes, bawdy-houſes, gaming-houſes, ſtages for rope-dancers, &c. are held to be common nuſances. A private nuſance is when only one perſon or family is annoyed, by the doing of any thing; as where a perſon ſtops up the light of another's houſe, or builds in ſuch a manner that the rain falls from his houſe upon his neighbour's; as likewiſe the turning or diverting water from running to a man's houſe, mill, meadow, &c. ſtopping up a way that leads from houſes to lands; ſuffering a houſe to decay, to the damage of the next houſe; erecting a brew houſe in any place not convenient; or an houſe of office, &c. ſo near another perſon's houſe as to offend him by its ſmell.

Indictment lies for a publick or common nuſance at the king's ſuit, whereon the party offending ſhall be fined and impriſoned; but no action can be brought in this caſe except one man ſuffers more by a common nuſance than another; as where a pit is dug in the highway, and he falls into it. Action on the caſe, or aſſiſe of nuſance, lies for any private nuſance, at the ſuit of the party aggrieved, and on ſuch actions judgment is given that the nuſance ſhall be removed, and the injured party recover damages; but if a perſon has only a term of years in a houſe or lands, as he has no freehold therein, he can only have an action on the caſe, by which the nuſance will be removed without his recovering damages.

NUT, *Nux*, a ſort of fruit incloſed in a hard ſhell, containing a kernel. Of theſe we have divers kinds.

NUTATION, in aſtronomy, a kind of tremulous motion of the axis of the earth, whereby, in each annual revolution, it is twice inclined to the ecliptick, and as often returns to its former poſition. Sir Iſaac Newton, in B. I. of his Principia, ſhews, that the moon has the like motion, but he obſerves, it is ſcarce ſenſible.

NUTMEG, *Nux moſchata*, in natural hiſtory, a kernel of a large nut, produced by a tree ſaid to reſemble the pear tree, growing in the E. Indies. The outer part of the fruit is a ſoft fleſhy ſubſtance like that of the walnut, which ſpontaneouſly opens when ripe: under this lies a red membrane called mace, forming a kind of reticular covering through the fiſſures of which is ſeen the hard woody ſhell that includes the nutmeg. Two ſorts of this kernel are diſtinguiſhed; one of an oblong figure, called male; the other roundiſh or of the ſhape of an olive, called female; this laſt is the officinal ſpecies, being preferred to the other on account of its ſtronger and more agreeable flavour, and its being, as is ſaid, leſs ſubject to become carious. The nutmegs are cured, according to Rumphius, by dipping them in a ſomewhat thick mixture of lime and water, that they may be every where coated with the lime, which contributes to their preſervation. The nutmeg is a moderately warm, grateful, unctuous ſpice; ſuppoſed to be particularly uſeful in weakneſs of appetite, and the nauſeæ and vomitings accompanying pregnancy, and in fluxes; but liable, when taken too freely, to ſit very uneaſy on the ſtomach, and, as is ſaid, to affect the head. Roaſted with a gentle heat, till it becomes eaſily friable, it proves leſs ſubject to theſe inconveniences, and is ſuppoſed likewiſe to be more uſeful in fluxes.

Nutmegs diſtilled with water, yield nearly one ſixteenth their weight of a limpid eſſential oil, very grateful, poſſeſſing the flavour of the ſpice in perfection, and which is ſaid to have ſome degree of an antiſpaſmodick or hypnotick power: on the ſurface of the remaining decoction is found floating an unctuous concrete matter like tallow, of a white colour, nearly inſipid, not eaſily corruptible; and hence recommended as a baſis for odoriferous balſams: the decoction, freed from this ſebaceous matter, and inſpiſſated, leaves a weakly bitter ſubaſtringent extract. Rectified ſpirit takes up, by maceration or digeſtion, the whole ſmell and taſte of the nutmegs, and receives from them a deep bright yellow colour: the ſpirit, drawn off by diſtillation from the filtered tincture, is very ſlightly impregnated with their flavour; greateſt part of the ſpecifick ſmell, as well as the aromatick warmth, bitteriſhneſs and ſubaſtringency of the ſpice remaining concentrated in the extract. The eſſential oil, and an agreeable cordial water, lightly flavoured with the volatile parts of the nutmeg by drawing off a gallon of proof ſpirit from two ounces of the ſpice, are kept in the ſhops. Both the oil, and the ſpirituous tincture and extracts, agree better with weak ſtomachs than an equivalent quantity of the nutmegs in ſubſtance.

Nutmegs, heated, and ſtrongly preſſed, give out a fluid yellow oil, which concretes on growing cold into a ſebaceous conſiſtence. Rumphius informs us, that in the Spice Iſlands, when the nuts are broken, thoſe kernels which appear damaged, carious, or unripe, are ſeparated for this uſe, and that 17 pounds and a quarter of ſuch kernels yield only one pound of oil, whereas when the nutmeg is in perfection, it is ſaid to afford near one third its own weight.

Two kinds of ſebaceous matter, ſaid to be expreſſed from the nutmeg, are diſtinguiſhed in the ſhops by the name of oil of mace; the beſt ſort, brought from the E. Indies in ſtone jars, is ſomewhat ſoft, of a yellow colour, and of a ſtrong agreeable ſmell greatly reſembling that of the nutmeg itſelf: the other comes from Holland in ſolid maſſes, generally flat, and of a ſquare figure, of a paler colour, and much weaker ſmell. Theſe oils are employed chiefly externally in ſtomachick plaſters, and in anodyne and nervine unguents and liniments. They appear to be a mixture of the groſs ſebaceous matter of the nutmeg with a little of the eſſential or aromatick oil; both which may be perfectly ſeparated from one another by maceration or digeſtion in rectified ſpirit, or by diſtillation with water. The ſpirituous tincture, and the diſtilled water, and the eſſential oil, are nearly ſimilar to thoſe drawn from the nutmeg itſelf, the pure white ſebaceous ſubſtance being left behind.

NUTRITION, in the animal œconomy, implies the repairing the continual loſs which the different parts of the body undergo. The motion of the parts of the body, the friction of theſe parts with each other, and eſpecially the action of the air, would deſtroy the body entirely, if the loſs was not repaired by a proper diet, containing nutritive juices: which being digeſted in the ſtomach, and afterwards

wards converted into chyle, mix with the blood, and are distributed through the whole body for its nutrition.

NUX MOSCHATA. See NUTMEG.

NUX *Pistachia*. See PISTACHIA.

NYCHTHEMERON, νυχθημερον, the natural day, or natural day and night, which together always make 24 hours. See DAY and NIGHT.

NYCTALOPIA, in medicine, a two-fold disorder of the eye, one of which is opposite to the other. In the first, the sight is best in the night, and in obscure places; whereas, in a clear light, their sight fails, so that they can hardly see any thing. In the other sort of nyctalopia, the patient can see nothing at all except in a clear and bright light. As these infirmities arise from a natural bad formation of the eye, they are therefore incurable.

NYCTANTHES, Arabian-jasmine, in botany, a genus of plants whose flower is monopetalous and saucer-shaped, divided at the top into eight oblong segments: the stamina are two subulated filaments topped with erect antheræ; the fruit is a roundish berry, having two cells, each containing a large roundish seed.

NYCTICORAX, a bird of the heron-kind, called in English the night-raven, by reason it flies chiefly in the night-time, and makes a very disagreeable croaking.

NYMPH, in mythology, an appellation given to certain inferior goddesses inhabiting the mountains, woods, waters, &c. said to be the daughters of Oceanus and Tethys.

NYMPH, among naturalists, that state of winged insects, between their living in the form of a worm and their appearing in the winged or most perfect state.

The eggs of insects are first hatched into a kind of worms, or maggots; which afterwards pass into the nymph-state, surrounded with shells or cases of their own skins; so that, in reality, these nymphs are only embryo-insects, wrapped up in this covering; from which they at last get loose, though not without great difficulty. During the nymph-state, the creature loses its motion. Swammerdam calls it nympha aurelia; and others give it the name of chrysalis, a term of the like import. See CHRYSALIS.

NYMPHÆ, in anatomy, two membranaceous parts, situated on each side the rima. They are of a red colour, and cavernous structure, somewhat resembling the wattles under a cock's throat. They are sometimes smaller, sometimes larger, and are continuous to the præputium of the clitoris, and joined to the interior side of the labia.

NYMPHÆA, the water-lily, in botany, a genus of plants, the flower of which consists of a number of petals, usually fifteen; they are smaller than the cup, and are inserted into the side of the germen in more than a single series; the fruit is an oval fleshy berry, containing a great many roundish seeds. The root of this plant was recommended by the ancients as an astringent for internal use, and as a styptick to stop the bleeding of wounds, or other hæmorrhages.

NYMPHÆUM, in antiquity, a publick hall magnificently decorated for banqueting, &c. where those who wanted conveniencies at home, held their marriage feasts, &c. The word is derived from the Greek, νυμφη, a bride.

NYMPHENBURGH MACHINE, in hydraulicks, the name of an engine for raising water, erected at Nymphenburgh in Germany, See WATER-WORKS.

NYMPHOMANIA, in medicine, the same with furor uterinus. See *furor* UTERINUS.

NYMPHOTOMIA, in surgery, the operation of cutting the nymphæ, when too large. See NYMPHÆ.

NYSSA, in botany, a genus of plants producing male and hermaphrodite flowers; they are both destitute of a corolla; but the cup is divided into five segments, and spreads open: the fruit is an ovate unilocular drupe, containing an oval acute nut.

O.

O, The fourteenth letter, and fourth vowel of our alphabet, pronounced as in the words, *nose*, *rose*, &c.

The sound of this letter is often so soft, as to require it double, and that chiefly in the middle of words; as *goose*, *reproof*, &c. and in some words this *oo* is pronounced like *u* short, as in *flood*, *blood*, &c.

O, among the ancients, was a numeral letter, signifying eleven; as in this verse,

O numerum gestat qui nunc undecimus extat.

When with a dash over it, thus, $\bar{o}$, it signified eleven thousand.

Among the Irish, the letter O at the beginning of the name of a family, is a character of dignity, annexed to great houses; as *O Neal*, *O Carrol*, &c. Camden observes, that it is the custom of the lords of Ireland to prefix an O to their names, to distinguish them from the commonalty.

In the notes of the ancients, O. CON. is read *opus conductum*; O. C. Q. *opera conciliοque*; O. D. M. *operæ, donum, munus*; and O. LO. *opus locatum*.

In musick, the O, or rather a circle, or double CƆ, is a note of time, called by us a semi-breve; and, by the Italians, circolo. The O is also used as a mark of triple time, as being the most perfect of all figures.

OAK-TREE, *Quercus*, in botany, a genus of plants, producing male and female flowers; the male are disposed in a loose amentum, each having a monophyllous cup, divided into four or five segments; there is no corolla, but several very short filaments topped with large twin antheræ: the cup of the female flower is formed of a single, rough, coriaceous, hemispherical leaf, undivided at the edge; the germen is ovate and small; the style is five-pointed and longer than the cup, and the stigmata are single and persistent: the fruit is an oval nut (commonly called an acorn) covered with a coriaceous substance, the base of it being placed in the cup. There are several species of oak, but the sort which is most commonly known, grows naturally in England in many places. It is said, that an oak-tree is an hundred years coming to its full growth, an hundred in perfection, and an hundred years decaying. The great advantages arising from plantations of this tree, is so well known to the nation, that it is scarce necessary to inform the reader of its great use in civil, and, particularly, naval architecture, there being no timber in the world so good for ship-building as the English oak, which makes our formidable fleets as much superior in the strength of their parts and for durability, as our seamen are in skill and courage to those of other nations.

The bark of the oak-tree is of very great service in tanning leather, and its acorns are excellent food for hogs. The excellency of this noble plant is so universally known, that to offer any thing in order to encourage its greater increase, would be needless, seeing that all our gentlemen of fortune are not only judges of its great use, but at this time are principally devoted to the pleasures and profit of planting in general, wherein the oak has a place not inferior to any. This advantageous plant is raised from the acorn, which should be sown immediately after its falling from the tree, which is about the beginning of November; and is always best when the acorn is planted in the place appointed for its future growth: but when it cannot be so ordered, they must be sown in a seed-bed, at about two or three inches asunder in the

nine

nine or ten inches row from row. In the ſpring, the plants will appear, when they muſt be kept clear from weeds; and the following October they may be tranſplanted in rows three feet aſunder, and eighteen inches in the rows, obſerving not to ſuffer the plants to abide long out of the ground at the time of tranſplanting; here they may remain for three or four years, at which time they will be large enough to be tranſplanted where they are intended to remain for good: the ſeaſon for this work is in autumn, at which time, if they are carefully taken up, there will be little danger of their ſucceeding, but the heads ſhould by no means be ſhortened, which is too much practiſed; all that ſhould be done, is only to cut off any bruiſed or ill-placed branches, which ſhould be taken off cloſe to the place where they are produced.

The ſoil in which the oak-tree makes the greateſt progreſs, is a deep rich loam, in which it grows to the largeſt ſize; and the timber of thoſe trees which grow upon this land, is generally more pliable than that which grows on a ſhallow or drier ground, but the wood of the latter is much more compact and hard. Indeed, there are few ſoils in England in which the oak will not grow, provided there is proper care taken in their cultivation, though this tree will not thrive equally in all ſoils; but yet it might be cultivated to a national advantage, upon many large waſtes in ſeveral parts of England, as alſo to the great profit of the eſtates where theſe tracts of land now lie uncultivated, and produce nothing to the owner.

The proper diſtance that oaks ſhould be planted from each other, in woods, groves, parks, &c. ſhould not be leſs than 30 feet. There are a great number of trees that go under the name of oak in divers parts of the world, but there is no where ſo many different kinds as in America, though the wood is not near ſo valuable as the Engliſh oak. In times of ſcarcity, a great many poor people have made bread of the acorns; and the poets tell us, they were the food of the golden age: however, they are heavy, windy, and hard to digeſt; therefore mankind, in thoſe early ages, muſt doubtleſs have had a better digeſtion than us.

The leaves of the oak are ſtyptick, a little bitteriſh, and all parts of it are aſtringent; they have often been preſcribed in all ſorts of hæmorrhages and fluxes of the belly.

OAK *of Jeruſalem*, or CHENOPODIUM, in botany, a genus of the *pentandria-digynia* claſs of plants, comprehending gooſe-foot, Engliſh mercury, and ſtinking orrach. It has no flower petals, nor pericarpium, except the cup, which contains a ſingle, orbicular, and depreſſed ſeed.

OAKAM, old ropes untwiſted, and pulled out into looſe hemp, in order to be uſed in caulking the ſeams, tree-nails, and bends of a ſhip, for ſtopping or preventing leaks.

OAR, in navigation, a long piece of wood, made round, where it is to be held in the hand, and thin and broad at the other end, for the eaſier cutting and reſiſting the water, and conſequently moving the veſſel, by rowing. Oars for ſhips are generally cut out of fir-timber, thoſe for barges are made out of New-England or Dantzick rafters, and thoſe for boats, either out of Engliſh aſh, or fir-rafters, from Norway.

OAT, *Avena*, in botany, a genus of plants, whoſe flowers grow in looſe particles; the cup is a bivalvular glume; the corolla conſiſts of two valves, the lower one being of the ſame ſize with the cup, putting out from the back a ſpiral awn or beard, which is jointed and reflexed: the ſtamina are three capillary filaments, topped with oblong forked antheræ: the corolla ſerves as a pericarpium, ſurrounding a ſingle ſeed, which is oblong and ſwelling, pointed at each end, having a longitudinal furrow, and ſhut up in the chaff.

There are three ſorts of oats cultivated in England, viz. the common or white oat, the black oat, and the brown or red oat; the firſt ſort is more common about London, the ſecond in the northern parts, and the red oats are cultivated in Derbyſhire, Staffordſhire, and Cheſhire, and are a very hardy ſort. Oats are a very profitable grain, and abſolutely neceſſary, being the principal grain which horſes love, and are eſteemed the moſt wholeſome food for thoſe uſeful animals, it being ſweet and of an opening nature, other grains being apt to bind, which is injurious to labouring horſes. Oats will thrive on cold barren ſoils which will produce no other ſort of grain; it will alſo grow on the hotteſt land; in ſhort, there is no land too rich or too poor for it, too hot or too cold, but it will grow on it; and in wet harveſts, when other grain is ſpoiled, this will receive but little or no damage; the ſtraw and huſks being of ſo dry a nature, that if they are houſed wet, they will not heat in the mow and become mouldy, as other grain uſually do.

The ſeaſon for ſowing oats is in February or March, according to the nature of the land, and as the ſeaſon is early or late. The meal of this grain makes tolerable good bread, and is the common food of the country people in the north; and in the ſouth, it is eſteemed for pottage and other uſes. Thoſe who feed upon it, are generally very healthy, which is a ſign that it yields good nouriſhment. Oatmeal blunts the acrimony of the humours, is cooling, and carries off acrimonious ſalts by the urinary paſſages: flummery with milk is uſed by many as a cooling diet in hot weather; and water-gruel is every where known for its inoffenſive properties.

OATH, *Juſjurandum*, is a ſolemn affirmation, in which the perſons ſworn invoke the Almighty to witneſs that their teſtimony is true, renouncing all claim to his mercy, and calling for his vengeance if it be falſe.

OBADIAH, or, *the Prophecy of* OBADIAH; a canonical book of the Old Teſtament, which is contained in one ſingle chapter, and is partly an invective againſt the cruelty of the Edomites, who mocked and derided the children of Iſrael, as they paſſed into captivity, and with other enemies, their confederates, invaded and oppreſſed thoſe ſtrangers, and divided the ſpoil among themſelves: and partly a prediction of the deliverance of Iſrael, and of the victory and triumph of the whole church over her enemies.

OBEDIENCE, or OBEDIENTIA, in the canon law, is ſometimes uſed for an office, or the adminiſtration of it. In our ancient cuſtoms, obedientia was uſed, in the general, for every thing that was enjoined the monks by the abbots: and in a more limited ſenſe it was applied to the farm belonging to the abbey, to which the monks were ſent vi ejuſdem obedientiæ, either to look after the farm, or collect the rents. Hence, theſe rents themſelves were alſo called obedientiæ.

OBELISK, in architecture, a truncated, quadrangular, and ſlender pyramid, raiſed as an ornament, and frequently charged either with inſcriptions or hieroglyphicks.

OBELISK, † in grammar, a mark in form of a dagger, uſed to refer the reader to a note in the margin, at the ſide or bottom of a page.

OBJECT, in philoſophy, ſomething apprehended, or preſented to the mind, by ſenſation or by imagination.

Chauvinus defines an object to be that about which a power, act, or habit is employed: thus, good is the object of the will, truth of the underſtanding; and, in like manner, colour is the object of ſight, ſound of hearing, &c.

OBJECT GLASS *of a Teleſcope, or Microſcope*, the glaſs placed at the end of the tube which is next the object. See TELESCOPE and MICROSCOPE.

OBJECTION, ſomething urged to overthrow a poſition, or a difficulty raiſed againſt an allegation, or propoſition of a perſon we are diſputing withal.

OBJECTIVE is uſed, in the ſchools, in ſpeaking of a thing which exiſts no otherwiſe, than as an object known. The exiſtence of ſuch a thing is ſaid to be objective. This word is alſo uſed for the power, or faculty, by which any thing becomes intelligible; and for the act itſelf, whereby any thing is preſented to the mind, and known.

OBIT, among Chriſtians, a funeral ſolemnity, or office for the dead, moſt commonly performed when the corpſe lies in the church uninterred. It likewiſe ſignifies the anniverſary office, or annual commemoration of the dead, performed yearly on the day of their death, with prayers, alms, &c. In religious houſes they have a regiſter, in which they enter the obits of their founders, or benefactors, which is thence termed the obituary.

OBLATI, in church hiſtory, were ſecular perſons, who devoted themſelves and their eſtates to ſome monaſtery, into which they were admitted as a kind of lay-brothers. The form of their admiſſion was, putting the bell-ropes of the church round their necks, as a mark of [illegible]ude.

ſervitude. They wore a religious habit, but differed from that of the monks.

OBLATION, a ſacrifice, or offering made to God.

OBLIGATION, in general, denotes any act whereby a perſon becomes bound to another, to do ſomething; as to pay a ſum of money, be ſurety, or the like.

Obligations are of three kinds, viz. natural, civil, and mixed. Natural obligations are entirely founded on natural equity; civil obligations, on civil authority alone, without any foundation in natural equity; and mixed obligations are thoſe which being founded on natural equity, are further enforced by civil authority.

OBLIQUE, in geometry, ſomething aſlant, or that deviates from the perpendicular. Thus an oblique angle is either an acute or obtuſe one, i. e. any angle except a right one. See ANGLE.

OBLIQUE *Aſcenſion*, in aſtronomy. See ASCENSION.

OBLIQUE *Caſes*, in grammar, are all the caſes except the nominative.

OBLIQUE *Line*, that which, falling on another line, makes oblique angles with it, viz. one acute, and the other obtuſe.

OBLIQUE *Planes*, in dialling, are thoſe which recline from the zenith, or incline towards the horizon.

The obliquity, or quantity of this inclination, or reclination, may be found by means of a quadrant.

OBLIQUE *Sailing*, in navigation, is when a ſhip ſails upon ſome rhumb between the four cardinal points, making an oblique angle with the meridian; in which caſe, ſhe continually changes both latitude and longitude. Oblique ſailing is of three kinds, viz. plain-ſailing, mercator's ſailing, and great circle-ſailing. See the article NAVIGATION.

OBLIQUE *Sphere*, is where the pole is elevated any number of degrees leſs than 90°, in which caſe the axis of the world, the equator, and parallels of declination, will cut the horizon obliquely.

OBLIQUITY, that which denotes a thing oblique.

OBLIQUITY *of the Ecliptick*, the angle contained between the ecliptick and the equinoctial.

OBLONG, in geometry, a figure longer than it is broad.

OBOLUS, a ſilver coin current at Athens, being the ſixth part of a drachma; worth ſomewhat more than a penny farthing ſterling.

OBOLUS, in pharmacy, a weight, ſix of which make a drachm, and conſequently equal to 10 grains.

OBREPTICIOUS, OBREPTITIOUS; a quality of letters patent, or other inſtrument, importing it obtained of a ſuperior by ſurprize, or concealing from him the truth.

OBSCURA CAMERA. See CAMERA OBSCURA.

OBSCURE, ſomething dark, or that only receives and reflects a ſmall quantity of light. It is alſo uſed in a figurative ſenſe, to ſignify a thing that is not clear, expreſs, or intelligible, or that is ambiguous.

OBSCURITY, that which denotes a thing to be obſcure.

OBSECRATION, in rhetorick, a figure, whereby the orator implores the aſſiſtance of God or man.

OBSEQUIES, funeral ſolemnities, or ceremonies performed at the burials of eminent perſons.

OBSERVATION, among navigators, implies the taking the ſun or ſtar's meridian altitude, in order thereby to find the latitude of the place.

When they have found the meridian altitude of the ſun or ſtar, they ſubtract it from 90°, which gives the diſtance of the object from the zenith, in order to find the latitude of the place, which we before obſerved under the article LATITUDE, is an arch of the meridian, intercepted between the zenith of any place and the equinoctial, being always equal to the height of the viſible pole, or arch of the meridian, comprehended between the pole and the horizon.

As the zenith diſtance is an arch of the meridian intercepted between the object and zenith of any place, being always equal to the complement of the object's meridian altitude; and as the declination of any object is an arch of the meridian, comprehended between its centre and the equinoctial; it follows, that if the zenith diſtance, or complement of the meridian altitude, and the declination of any heavenly object be given, we may from thence find the latitude of the place of obſervation.

If the object be in the equinoctial, or have no declination, the meridional zenith diſtance will be equal to the latitude of the place; for then the zenith diſtance will be the arch of the meridian, intercepted between the equinoctial and zenith; which if the object, when in the meridian, be to the ſouthward of the place of obſervation, the latitude will be north; but, if to the northward, it will be ſouth. This is ſo eaſy that it needs no example. If the object appear in the zenith, the declination will be equal to the latitude of the place, for then the declination is equal to the arch of the meridian, comprehended between the zenith and equinoctial, which will be of the ſame name with it, that is, if the declination be north; but, if the ſouth, the latitude will be ſouth. This is alſo ſo eaſy, that it would be ſuperfluous to give an example.

If the object have both declination and zenith diſtance, and they be both of one denomination, i. e. if the object, when on the meridian, be to the northward of the place of obſervation, and its declination be north; or, if it lie to the ſouthward, and its declination be ſouth; then, if the zenith diſtance be equal to the declination, the latitude vaniſhes, the place being ſituated under the equinoctial; but, if the zenith diſtance be greater than the declination, their difference will be the latitude, which will be of a contrary name, with the declination and zenith diſtance, that is, if the declination, &c. be north, the latitude will be ſouth, and the contrary; but, if the zenith diſtance be leſs than their declination, their difference will be the latitude, which will be of the ſame name with the declination and zenith diſtance.

If the meridional zenith diſtance and the declination of any heavenly object be of contrary denominations, that is, the one north, and the other ſouth; then their ſum will be the latitude of the place; which will always be of the ſame name with the declination, that is, if the declination be north, the latitude is north, &c.

When the latitude of the place exceeds the complement of the declination, and are both the ſame way, then the object will never ſet but tranſit the meridian, on the contrary ſides of the zenith; from the greateſt meridional zenith diſtance, take the leaſt, and half the remainder will be the complement of the latitude of the place; which is north, if the greater of the ſecond zenith diſtances be north; but, if the greater be ſouth, the latitude is ſouth.

OBSERVATORY, a place deſtined for the obſervation of the heavenly bodies; being, generally, a building erected on ſome eminence, and covered with a terrace for making aſtronomical obſervations.

OBSTETRICATION, *Obſtetricatio*, midwifry, or the delivering a woman with child.

OBSTRUCTION, in medicine, a ſtoppage of the natural paſſages or cavities of the body, occaſioned either by the exceſſive quantity, or the viſcous quality of the humours; as *lentor*, thickneſs, or the like.

OBSTRUENTS, ſee DEOBSTRUENTS.

OBTURATOR, in anatomy, a name given to two muſcles of the thigh; becauſe they ſhut up the foramen, or aperture between the os pubis and the hip-bone.

OBTURATOR *Internus*, is a muſcle which comes from the internal circumference of the hole that is between the iſchium and os pubis; and, paſſing through the ſinuoſity of the iſchium, it is inſerted into the dent of the great trochanter. Its tendon lies between the gemini; it turns the thigh to the outſide.

OBTURATOR *Externus*, comes from the external circumference of the ſame hole as the former; it embraces the neck of the thigh-bone, and paſſes under the quadratus to the ſmall cavity of the great trochanter.

OBTUSE, blunt, or dull; in oppoſition to acute, ſharp or briſk.

OBTUSE *Angle*, in geometry, an angle greater than 90°.

OBTUSE-ANGLED *Triangle*, a triangle having one angle obtuſe, or greater than 90°.

OCCIDENTAL, weſtern, or belonging to the weſt.

OCCIPITAL, in anatomy, an epithet applied to the parts belonging to the occiput, or hinder part of the head.

OCCIPITALES, or OCCIPITAL *Muſcles*, are a pair of muſcles of the head, whoſe origin is in the upper part of the head, near the vertex; and from thence run backwards,

backwards, and are inferted into the lower part of the fkin of the occiput, which they ferve to draw upwards.

OCCIPITIS Os, in anatomy, the fourth bone of the cranium; fo called from its fituation in the occiput.

OCCIPUT, the hinder part of the head, or fkull.

OCCULT, fomething fecret, hidden, or invifible.

Occult, in geometry, is applied to a line that is juft perceivable, drawn with the point of the compaffes, or a black lead pencil.

OCCULTATION, in aftronomy, the time a ftar, or planet, is hid from our fight, by the interpofition of the body of the moon or fome other planet.

Circle of perpetual Occultation, is a parallel, in an oblique fphere, as far diftant from the depreffed pole, as the elevated pole is from the horizon. All the ftars contained between this parallel and the pole never rife, being conftantly hid under the horizon of the place.

OCCUPANT, in law, he that firft feizes and takes poffeffion of a thing.

OCCUPATION, in a legal fenfe, is taken for ufe or tenor, as in deeds it is frequently faid, that fuch lands are, or lately were, in the tenure or occupation of fuch a perfon. This is likewife ufed for a trade or myftery.

Occupation, or Occupancy, in the civil law, denotes the poffeffion of fuch things as at prefent properly belong to no private perfon; but are capable of being made fo, as by feizing or taking of fpoils in war, by catching things wild by nature, as birds and beafts of game, &c. or by finding things before undifcovered, or loft by their proper owners.

OCEAN, in geography, that vaft collection of falt and navigable waters, in which the two continents, the firft including Europe, Afia, and Africa; and the laft America, are inclofed like iflands. The ocean is diftinguifhed into three grand divifions. 1. The Atlantick ocean, which divides Europe and Africa from America, which is generally about three thoufand miles wide. 2. The Pacifick ocean, or South-fea, which divides America from Afia, and is generally about ten thoufand miles over. And, 3. The Indian ocean, which feparates the E. Indies from Africa, which is three thoufand miles over. The other feas, which are called oceans, are only parts or branches of thefe, and ufually receive their names from the countries they border upon.

OCHRE, *Ochra*, in natural hiftory, a genus of earths, flightly coherent, and compofed of fine, fmooth, foft, argillaceous particles, rough to the touch, and readily diffufible in water. Ochres are of various colours, as red, yellow, blue, brown, green, &c. Of the red there are eleven fpecies, of the yellow as many, of blue one, of brown two, of green one, and of black two. All which have, at one time or other, been ufed in painting.

OCIMUM, bafil, in botany. See Basil.

OCTAERIDES, in chronology, denotes a cycle of eight years, at the end of which, three entire lunar months were added. This cycle was in ufe at Athens, till Meton difcovered the golden number.

OCTAGON, or Octogon, in geometry, is a figure of eight fides and angles: and this, when all the fides and angles are equal, is called a regular octagon, or one which may be infcribed in a circle.

Octagon, in fortification, denotes a place that has eight baftions, See Fortification.

OCTAHEDRON, or Octaedron, in geometry, one of the five regular bodies, confifting of eight equal and equilateral triangles. See Solid. The fquare of the fide of the octahedron is to the fquare of the diameter of the circumfcribing fphere, as 1 to 2. If the diameter of the fphere be 2, the folidity of the octahedron infcribed in it will be 1,33333, nearly. The octahedron is two pyramids put together at their bafes, therefore its folidity may be found by multiplying the quadrangular bafe of either of them, by one third of the perpendicular height of one of them, and then doubling the product.

OCTANDRIA, the name of the eighth clafs in the Linnæan fyftem of botany: it comprehends all thofe plants whofe flowers are hermaphrodite and furnifhed with eight ftamina or male parts in each. To this clafs belong the Indian crefs, knot-grafs, tree-primrofe, French willow, &c.

OCTANT, or Octile, in aftronomy, that afpect of two planets, wherein they are diftant an eighth part of a circle, or 45° from each other.

OCTAVE, in mufick, an harmonical interval, confifting of feven degrees, or lefs intervals.

OCTOSTYLE, in the ancient architecture, is the face of an edifice adorned with eight columns.

The eight columns of the octoftyle may either be difpofed in a right line, as in the Pantheon, and the pfeudodiptere temple of Vitruvius; or in a circle, as in the round monothere temple of Apollo Pythius at Delphi, &c.

OCULUS, the eye, in anatomy. See Eye.

ODE, in poetry, a fong, or a compofition proper to be fung. Among the ancients, ode fignified no more than fongs; but with us they are very different things. The ancient odes were generally compofed in honour of their gods, as many of thofe of Pindar and Horace.

Thefe had originally but one ftanza, or ftrophe, but afterwards they were divided into three parts, the ftrophe, the antiftrophe, and the epode. The priefts going round the altar finging the praifes of the gods, called the firft entrance, when they turned to the left, the ftrophe; the fecond, turning to the right, they called antiftrophe, or returning; and, laftly, ftanding before the altar, they fung the remainder, which they called the epode.

ODOROUS, or Odoriferous, appellations given to whatever fmells ftrongly, whether they be fetid or agreeable; but chiefly to things whofe fmell is brifk and agreeable.

ODYSSEE, Odyssea, an epick poem, containing the adventures of Ulyffes in his return from the fiege of Troy to Ithaca, compofed by Homer. The defign of the Odyffee, fays F. Boffu, was to inftruct the ftates, confidered in their feveral private capacities. See Iliad.

The truth or moral, whereon this fable is founded, being, that a perfon's abfence from home, fo that he cannot have an eye to his affairs, occafions great diforders; accordingly the hero's abfence is the principal and moft effential action of the piece, and takes up the greateft part of the poem. This poem, Boffu adds, is calculated more for the people than the Iliad is, where the fubjects are rather ill ufed from the bad conduct of the princes, than by their own fault. The great names of hero, Ulyffes, &c. do not here reprefent the pooreft peafants lefs than princes; the meaneft people are as liable to ruin their eftates and families by negligence, &c. as the greateft, and accordingly have as much need of Homer's lectures, and are as capable of profiting by them as kings themfelves.

OECONOMICKS, *Oeconomica*, that part of moral philofophy which teaches how to manage the affairs of a family.

OECONOMY, the prudent conduct, or difcreet and frugal management of a man's eftate, or that of another *.

Animal Oeconomy, the firft branch of the theory of medicine; or that which explains the parts of the human body, their ftructure and ufe, the nature and caufes of life and health, and the effects, or phænomena arifing from them.

OECUMENICAL, general or univerfal. As an Oecumenical council, or fynod; that is, one at which the whole Chriftian church affifted.

OEDEMA, a tumor in general; but it is ufually applied to a white foft infenfible tumor, proceeding from cold and aqueous humours, fuch as happen to dropfical conftitutions.

OEDEMATOUS, in medicine, fomething of the nature of an œdema, or feized or afflicted with an œdema.

OENELÆUM, in pharmacy, a mixture of wine and oil; ufually of thick black wine, and oil of rofes,

OENOPTÆ, a kind of officers, or cenfors, at Athens, who attended at their feafts, regulated the number of cups each was to drink, and took care that none drank too much, or too little.

OESOPHAGUS, in anatomy, the gullet, or membranous canal, which conveys the aliment from the mouth to the ftomach.

OFFA Alba, a name given by Helmont to the white coagulum, arifing from a mixture of rectified fpirit of wine and fpirit of urine.

OFFERTORY, an anthem fung, or played on the organ, at the time the people are making an offering. It alfo anciently fignified the linen whereon the offerings were laid.

OFFICE, *Officium*, in a moral fenfe, implies a duty; or that which virtue and right reafon require a man to do.

OFFICE, in a civil fenfe, fignifies the mutual aid and affiftance which men owe to one another.

OFFICE, is alfo a particular charge, or truft, whereby a man is authorized to do fomething.

OFFICE, alfo fignifies a place, apartment, or board, appointed for the officers to attend in, for the difcharge of their refpective duties, or employments.

OFFICE, in the canon law, is ufed for a benefice, that has no jurifdiction annexed to it.

OFFICE, is likewife ufed for the divine fervice celebrated in publick.

OFFICES, in architecture, denote all the apartments that ferve for the neceffary occafions of a great houfe, or place; as kitchens, pantries, brew-houfes, confectionaries, &c.

OFFICER, a perfon poffeffed of an office, or poft, either in a civil, maritime, or military capacity.

OFFICINAL, an epithet applied to all forts of medicines, whether fimple or compound, as are required to be conftantly kept in the fhops.

OFFING, or OFFIN, among feamen, implies that part of the fea, at a good diftance from the fhore, where there is deep water, and no need of a pilot.

When a fhip is feen from the fhore, failing to feaward, they fay, fhe ftands for the offing, &c.

OFF-SETS, in gardening, &c. are thofe young fhoots which fpring and grow from roots of plants. It is alfo by fome applied to the loofe, outer, brown fkins of tulips, onions, &c.

OFF-SETS, in furveying, are perpendiculars let fall, and meafured from the ftationary lines, to the hedge, fence, or extremity of the inclofure.

OGEE, or O—G—, in architecture, a moulding, confifting of two members, the one concave, the other convex: the fame with what is otherwife called cymatium. See CYMATIUM.

OGIVES, arches or branches of a Gothick vault, which, inftead of being circular, pafs diagonally from one angle to another, and form a crofs with the other arches which make the fide of the fquare, whereof the ogives are diagonals.

OIL, *Oleum*, an unctuous, inflammable matter, drawn from feveral natural bodies.

The chymifts call it fulphur, being the fecond of their hypoftatical, and of the true five chymical principles. To this they attribute all the diverfity of colours, and all the beauty and deformity of bodies: probably their various odours in a great meafure arife from it. It fweetens the acrimony of falts; and by ftopping, or filling up the pores of a mixed body, keeps it longer from corruption, where it abounds. And we find that the evergreens, fuch as box, holly, &c. abound more with oil than other plants.

There are two forts of oils; one which feems to be mixed with fpirit (for it can never be drawn pure) and which will fwim upon water; fuch as oil of anifeeds, lavender, rofemary, &c. which the chymifts call effential, and is commonly drawn in a limbeck, with ftore of water. And another kind, which probably is mixed with falts, and thefe will fink in water; fuch are the oils of ponderous woods, as guaicum, box, cloves, &c.

There are fome things which are very improperly called oils; as oil of tartar per deliquium, which is only a fixed falt diffolved; oil of vitriol, which is nothing but the moft cauftick and ftrongeft part of the fpirit of vitriol; oil of antimony, which is only a mixture of antimony and an acid fpirit.

OINTMENT, or UNGUENT, in pharmacy. See UNGUENT.

OKER, OCHRA, an argillaceous earth, found plentifully in Shottover hills, in Oxfordfhire, and much ufed in the coarfer kinds of painting.

OLEAGINOUS, fomething partaking of the nature of oil, or from whence oil may be extracted.

Laws of OLERON, a fet of laws relating to maritime affairs, made in the ifle of Oleron, in the bay of Aquitaine, by Richard I.

OLEFACTORY NERVES, in anatomy, the firft pair of nerves coming from the medulla oblongata; fo called from their being the immediate object of fmelling.

OLIBANUM, frankincenfe, in pharmacy, a dry refinous fubftance brought to us in detached pieces or drops as it were, like thofe of maftick, but larger, and of a lefs pure and pellucid texture. It is of a pale yellowifh white colour, but with fome mixture of a brownifh caft in it. It is moderately heavy: its fmell is ftrong, but not difagreeable, and its tafte bitter, acrid, and refinous.

Olibanum is greatly commended by many againft diforders of the head and breaft, and againft diarrhoea's and dyfenteries, and profluvia of the menfes, and fluor albus. Its dofe is from ten grains to a drachm. It is by many efteemed a fpecifick in pleurifies, efpecially when epidemick. Externally it is ufed in fumigations for diforders of the head, and againft catarrhs, and is an ingredient in fome plaifters. It is a noble balfam in confumptions, given in fubftance, or diffolved with the yoke of an egg into the form of an emulfion. There is an oil made of it by deliquium, in the fame manner as that of myrrh. This is done by putting the powder of it in the white of a boiled egg in a cellar till it runs into a liquor; this is efteemed a great cofmetick and deftroyer of pimples in the face. Diofcorides had his doubts about the internal ufe of olibanum in large dofes; he talks of its bringing on madnefs, and even death: but none of the other Greek writers fay any thing of its ill qualities, nor do we at prefent know any of them.

OLIGARCHY, a form of government, where the adminiftration is lodged in the hands of a few people.

OLITORY, a kitchen garden; or a garden of herbs, roots &c. for food.

OLIVE-TREE, *Olea*, in botany, a genus of plants whofe flower is monopetalous, and funnel-fhaped: the tube is cylindraceous, and the whole length of the cup and limb divided into four fegments, which fpread open; the ftamina are two fhort fubulated filaments, topped with erect antheræ. The fruit is a fmooth oval, unilocular drupe, including an ovato-oblong wrinkled nut, having a kernel of the fame fhape.

Olives are very oily and fmooth, and therefore not good for the ftomach, being apt to pall and relax it too much. The oil of olives is judicioufly mixed with cataplafms of a maturating nature; it is accounted heating, emollient, and vulnerary; and good againft coftivenefs and gripes.

OLIVE-*Colour*, a yellow mingled with black. See the article COLOUR.

OLYMPIAD, ολυμπιας, in chronology, the fpace or period of four years, whereby the Greeks reckoned time; for the epocha or commencement of which, fee EPOCHA.

OLYMPICK GAMES, were folemn games, famous among the ancient Greeks, fo called from Olympian Jupiter, to whom they were dedicated; and by fome faid to be firft inftituted by Jupiter, after his victory over the fons of Titan; others afcribe this inftitution to Hercules, not the fon of Alcmena, but one of much greater antiquity; others to Pelops; and others, to Hercules the fon of Alcmena. Thefe games were fo confiderable, that the Greeks made them their epocha, diftinguifhing their years by the return of the olympicks.

OMEN, a certain accident and cafual occurrence, that was thought to prefage either good or evil.

OMENTUM, or EPIPLOON, the cawl, in anatomy, a membranaceous part, ufually furnifhed with a large quantity of fat; being placed under the peritonæum, and immediately above the inteftines. It is called by fome rete, and reticulum, from the number of holes appearing in it, when raifed, and giving it the refemblance of a net.

As to its fituation, it ufually occupies only the upper part of the abdomen; though it is fometimes found extended to the lower part: its weight in a perfon not remarkably fat or lean, is about half a pound: its lower part is evidently loofe and free; but in its upper part it is joined, anteriorly, to the bottom of the ftomach, the duodenum, and the fpleen; and pofteriorly to the colon and pancreas. It is compofed of a very tender double membrane, forming a kind of pouch or cavity, called its burfa, and replete with fat, lodged in certain cellules, forming a kind of ducts, with certain areolæ, or membranaceous

branaceous ſpaces between them. Its arteries come from the cœliae, and are very numerous; its veins ariſe chiefly from the ſplenick branch of the vena portæ; and its nerves are from the intercoſtals and the par vagum. See ARTERY, VEIN, &c.

It has a very remarkable aperture, by which it may be conveniently diſtended by inflation; and there are generally ſome ſmall holes in it, though the large ones, from which it got the name rete, are adventitious.

The uſes of the omentum are, 1. By its lubricity, to render the natural and neceſſary motions of the inteſtines eaſy: 2. To cheriſh and defend the inteſtines from cold: 3. To aſſiſt in the formation of the bile, the fatty part of which is wholly owing to the veſſels of the omentum; every thing that returns from this part going to the liver: 4. To temperate the acrimony of the humours: and, probably, 5. To ſerve as all the other fat of the body, to give it nouriſhment, when it is incapable of being nouriſhed any other way.

ONANIA, or ONANISM, terms which ſome late empericks have framed, to denote the crime of ſelf-pollution, mentioned in ſcripture to have been practiſed by Onan, and puniſhed in him with death.

ONDEE, in heraldry, the ſame with wavy. See WAVED.

ONEIROCRITICA, *ονειροκριτικη*, the art of interpreting dreams, or predicting future events from dreams.

ONGLEE, in heraldry, an appellation given to the talons or claws of beaſts or birds, when borne of a different colour from that of the body of the animal.

ONION, *Cepa*, in botany, a genus of plants, too well known to need a particular deſcription; and of which there are ſeveral ſorts, as the Stratſburgh onion, Spaniſh onion, Portugal onion, &c.

Onion-ſeed may be ſown in beds in the month of Auguſt, for a ſupply in the ſpring; and likewiſe they may be ſown in the ſpring, in beds, to draw up for young ſallads, after the Michaelmas onions are grown too large for that purpoſe.

Onions are chiefly uſed for culinary purpoſes, and are eaten raw by ſome, and roaſted by others, but are more commonly boiled: they are windy, heating, and cauſe thirſt, and therefore are bad for hot conſtitutions; however, when boiled and mixed with honey, they are good in diſorders of the lungs, ariſing from a thick clammy phlegm: they are alſo in great eſteem to draw and ſuppurate all kinds of tumours; roaſted, and applied to the ear, they help to ripen, break, and cleanſe away, impoſthumations in the head, which ſometimes cannot be influenced by any other means: a cataplaſm of roaſted onions and freſh butter is an excellent external application for the piles.

ONOMANCY, or rather ONOMAMANCY, *ονομαμαντεια*, a branch of divination, which foretels the good or bad fortune of a man, from the letters in his name. From much the ſame principle the young Romans toaſted their miſtreſſes as often as there were letters in their names: hence Martial ſays,

Nævia ſex cyathis, ſeptem Juſtina bibatur.

ONTOLOGY, or ONTOSOPHY, the doctrine or ſcience de ente; that is, of being, in the general, or abſtract.

ONYCHOMANCY, a kind of divination by means of the nails of the fingers.

ONYX, in natural hiſtory, one of the ſemipellucid gems, with variouſly coloured zones, but none red; being compoſed of cryſtal, debaſed by a ſmall admixture of earth; and made up either of a number of flat plates, or of a ſeries of coats ſurrounding a central nucleus, and ſeparated from each other by veins of a different colour, reſembling zones or belts.

We have four ſpecies of this gem. 1. A bluiſh-white one, with broad white zones. 2. A very pure onyx, with ſnow-white veins. 3. The jaſponyx, or horney-onyx, with green zones. 4. The brown onyx, with bluiſh-white zones.

The ancients attributed wonderful properties to the onyx; and imagined that if worn on the finger it acted as a cardiack: they have alſo recommended it as an aſtringent, but at preſent no regard is paid to it.

OOST, a kiln for drying hops after they are picked from the ſtalks.

OPACITY, in philoſophy, a quality of bodies which renders them impervious to the rays of light. See LIGHT.

OPAL, in natural hiſtory, a gem of a very peculiar kind, and has been eſteemed by many, in all ages, of very great value; though at preſent it is of leſs value, in proportion to its ſize, than any of the finer gems. It is ſofter than any other of the fine gems, and is difficult to poliſh to any degree of nicety: it is found of various ſhapes and ſizes; its moſt frequent bigneſs is between that of a pea and a horſe bean; but it is found as ſmall as the head of a large pin, and has been ſeen of the ſize of a large walnut. Its figure is very various and uncertain, but it is never found in a chryſtalliform or columnar ſtate; its moſt uſual ſhape is an irregularly oblong one, convex above, flatted at bottom, and dented with various ſinuoſities at its ſides. It is often found among the looſe earth of mountains, ſometimes on the ſhores of rivers, and not unfrequently bedded in the coarſer kinds of jaſper. It is found in Egypt, Arabia, ſome parts of the E. Indies, and in many parts of Europe; thoſe of Europe are principally from Bohemia, and are of a greeniſh or greyiſh colour; the colour of other opals much reſembles the fineſt mother of pearl, its baſis ſeeming a bluiſh or greyiſh white, but with a property of reflecting all the colours of the rainbow, as turned differently to the light.

OPALIA, in antiquity, feaſts celebrated at Rome, in honour of the goddeſs Ops.

OPEN FLANK, in fortification, that part of the flank which is covered by the orillon.

OPENING *of Trenches*, in the firſt breaking of ground by the beſiegers, in order to carry on their approaches towards a place. See TRENCHES.

OPERA, a dramatick compoſition ſet to muſick, and ſung on the ſtage, accompanied with muſical inſtruments, and enriched with magnificent dreſſes, machines, and other decorations.

OPERATION, in general, the act of exerting or exerciſing ſome power or faculty, upon which an effect follows.

OPHITES, in natural hiſtory, a ſort of variegated marble, of a duſky-green ground, ſprinkled with ſpots of a lighter green, otherwiſe called ſerpentine.

OPHITES, in church hiſtory, Chriſtian hereticks, ſo called both from the veneration they had for the ſerpent that tempted Eve, and the worſhip they paid to a real ſerpent: they pretended that the ſerpent was Jeſus Chriſt, and that he taught men the knowledge of good and evil: they diſtinguiſhed between Jeſus and Chriſt; Jeſus, they ſaid, was born of the virgin, but Chriſt came down from heaven to be united with him: Jeſus was crucified, but Chriſt had left him, to return to heaven. They diſtinguiſhed the God of the Jews whom they termed Jaldabaoth, from the ſupreme God: to the former they aſcribed the body, to the latter the ſoul of men. They had a live ſerpent which they kept in a kind of cage; at certain times they opened the cage door and called the ſerpent: the animal came out, and mounting upon the table, twined itſelf about ſome loaves of bread; this bread they broke and diſtributed it to the company, who all kiſſed the ſerpent: this they called their Euchariſt.

OPHTHALMIA, in medicine, ſignifies any diſorder or pain in the eye; but it is uſed ſtrictly to expreſs an inflammation of that organ.

OPIATES, in pharmacy, medicines in which opium is an ingredient.

OPINION, an aſſent of the mind to any propoſition not evidently true at firſt ſight.

OPIUM, in pharmacy, an inſpiſſated juice, partly of the reſinous and partly of the gummy kind. It is brought to us in cakes or maſſes, uſually of a roundiſh figure, flatted, and covered with poppy leaves. Theſe are of uncertain ſizes, uſually about an inch thick, and their weight from eight ounces to a pound.

Opium is very heavy, of a denſe texture, not perfectly dry, but more or leſs ſoft, and, commonly, eaſily receiving an impreſſion from the finger; it is tough and hard to break, its colour a browniſh yellow, ſo very dark and duſky that in the maſs at firſt ſight it appears black, and of a faint, dead, unpleaſant ſmell, bitter to the taſte, and very acrid.

It is inflammable, yet in great part ſoluble, in water,

it is brought to us from Natolia, from Ægypt, and from the E. Indies; and is to be chofen moderately firm, not too foft, as our druggifts often render it, by keeping it in damp vaults to increafe its weight; its fmell and tafte muft be very ftrong, and great care muft be taken that there is no dirty or ftony matter in it.

The Europeans, for many ages, efteemed the Thebaick opium greatly fuperior to that of Afia Minor, or the E. Indies, but at prefent there is no diftinction made; but opium that is not too dry and friable, and that has a good fmell, and no accidental foulnefs mixed among it, is all efteemed of equal value.

The plant which affords opium is one of the polyandria monogynia of Linnæus, and one of the herbæ flore tetrapetalo anomalo of Ray; and is defcribed by all the botanical writers under the name of the white garden poppy, the papaver hortenfe femine albo, papaver fativum Diofcoridis, and papaver album Plinii.

The fields of Afia Minor are in many places fown with the white poppy, as ours are with corn. When the heads grow towards maturity, but are yet foft, green, and full of juice, they make incifions on them, and from every one of thefe there flow a few drops of a milky juice, which foon hardens into a folid confiftence: thefe drops are gathered with great care, and are the fineft opium. Tournefort tells us, that, after they have obtained all they can this way, they bruife the heads and exprefs their juice, and by this means get a much larger quantity: but Bellonius, who had been through the fame place where Tournefort was, fays not a word about this opium procured by expreffion; nor does Kæmpfer mention any fuch procefs in his treating of obtaining opium in the Eaft. Both thefe authors make three kinds of opium, but no one of them is procured in this coarfe way. Kæmpfer's account is this: when the heads are near ripening, they wound them with an inftrument, which is a kind of knife with five edges; this, on being ftruck into the head, makes five long cuts in it, from which the opium flows, and is the next day fcraped off with an edgelefs knife, and is put up in a veffel, faftened to the girdle for that purpofe: at the time the opium is collected, the oppofite fide of the poppy-head is wounded by the fame inftrument ufed at firft, and the opium is collected next day in the fame manner. They diftinguifh, however, the produce of the firft wounds from thofe of the fecond, and with great reafon, the firft being greatly fuperior to the fecond. They call this firft flowing off the heads gobaar; it has much more virtue than the reft, and is fold at a much greater price; its colour is at firft white, but afterwards yellowifh; and, when long kept, of a dufky brown. The opium produced from the fecond wounds is darker-coloured, and approaches to blacknefs; it has a weaker fmell and tafte than the former: after this they make a third operation, but the produce is black, and of very little value.

After they have collected the opium, they moiften it with a fmall quantity of water, or of honey, and work it a long time upon a flat, hard, fmooth board, with a thick and ftrong inftrument of the fame wood, till it becomes of the confiftence of pitch: finally, they work it up with their hands, and form it into cakes, or rolls, for fale. Multitudes of people are continually employed in this preparation, and have feveral ways of doing it; but what we have is the mere crude juice, or at moft fuch as has been worked up with water, or a fmall portion of honey, no more than fufficient to bring it into form.

Opium has been, till lately, confidered in general as a foporifick and fudorifick only; and its ufe moftly confined to the removal of deliriums, nervous coughs, and fome other particular purpofes: but the experience of modern practice has fo extended its application, as to give a fufficient light into the true nature of it. The quality of opium, to which its medicinal effects are owing, is the diminifhing the fenfibility and tendernefs of the nerves in fuch a manner, that fpafms and convulfive cramps that are excited by inflammation, or the action of any irritating bodies, are thereby greatly mitigated, and in general removed; and the fymptomatick mifchiefs attending many diforders thence prevented or leffened. This power therefore renders it of very great fervice in the following diforders, the evil confequences whereof are the refult of the irritating acrimony of depraved humours: firft, in the cholera morbus, where the whole of the danger arifes from the violent convulfions, caufed by the intolerable ftimulus of exceffively acrid bile, poured out of the ductus choledochus communis into the inteftines, in an incredible quantity; in this cafe opium will give a reprieve from the fatal confequences of the fpafm, till a difcharge of the morbid matter is procured by the aid of cathartıcks, when it would be impracticable, by any other means, to give the leaft relief. It is in like manner highly efficacious in diarrhœas and dyfenteries, which owe their origin to a parallel caufe; as alfo in the convulfions of children, produced by an acefcent acrimony of the humours in the via prima: it is, when judicioufly ufed, of great importance in feveral cafes of eruptive and other fevers, where a fpafmodick ftate arifes from nervous irritations, particularly in refpect of children, where, by a proper ufe of this medicine, the fatal fpafms which attend their coming out may be frequently evaded. It is likewife of great efficacy in many female cafes, relieving the convulfive diforders of the uterus, and checking thofe exceffive difcharges of the catamenia and profufe hæmorrhages, confequent to delivery, which are caufed by them. Befides thefe there are many occafions not reducible to the general rules, where, on the fame principle, this quality of opium may remove fymptoms, which would be otherwife fatal or dangerous, and on which all the other qualities of medicine could have no influence; whence, it may therefore be juftly ranked among thofe few medicines, of whofe effects, the recovery of the patient from violent and dangerous difeafes, is the evident refult: but if given in too great a quantity, is deadly.

Prepared Opium, or *Laudanum*, a tincture of opium, made either with fpirit of wine or water, having different ingredients added to it, according to the ufe it is intended for.

OPOBALSAMUM, in pharmacy, the fame with the balfam, or balm of Gilead. See Balsam.

OPOPANAX, in the materia medica, is a gum refin of a tolerably firm texture, ufually brought to us in loofe granules or drops, and fometimes in large maffes, formed of a number of thefe connected by a quantity of matter of the fame kind; but thefe are ufually loaded with extraneous matter, and are greatly inferior to the pure loofe kind. The drops or granules of the fine opopanax, are on the outfide of a brownifh red colour, and of a dufky yellowifh or whitifh colour within: they are of a fomewhat unctuous appearance, fmooth on the furface; and are to be chofen in clear pieces, of a ftrong fmell and acrid tafte.

Opopanax is attenuating and difcutient, and is gently purgative; it difpels flatulencies, and is good in afthmas, in inveterate coughs, and in diforders of the head and nerves. It alfo promotes the menfes, and is good againft all obftructions of the vifcera.

OPOSSUM, in zoology, a fpecies of didelphis, with the paps within the abdomen.

The opoffum is a very fingular animal, about fifteen inches long from the extremity of the nofe to the rump; and its tail is equal in length to the whole body: the legs are robuft, and the feet armed with fharp, long, and crooked claws. But what is moft fingular in this animal, is, that the fkin of the belly of the female is loofe, forming a kind of pouch or bag, with an aperture in it, at which, in time of danger, it takes in its young.

OPPONENT, a perfon who withftands or oppofes another. This term is chiefly ufed in fcholaftick or academick difputes or exercifes, where a perfon who oppofes a thefis, or impugns it by his objections, is called opponent.

OPPOSITES, *Oppofita*, among logicians, fimply taken, are fuch things as differ among themfelves, but fo as not to differ in like manner from fome third.

OPPOSITION, in logick, the difagreement between propofitions, which have the fame fubject and the fame predicate.

Opposition, in aftronomy, is that afpect or fituation of two ftars or planets, wherein they are diametrically oppofite to each other, or 180° afunder.

Opposition, in geometry, the relation of two things, between which a line may be drawn perpendicular to both.

Opposition, in rhetorick, a figure whereby two things are joined, which feem incompatible; as, a wife folly.

OPTATIVE

OPTATIVE Mood, in grammar, that which ferves to exprefs an ardent defire or wifh for fomething. See Mood.

OPTICK, or Optical, fomething relating to vifion, or the fenfe of fight.

Optick *Angle*. See Angle.

Optick *Axis*, is a ray paffing through the centre of the eye, and the middle of the optick pyramid.

Optick *Glaffes*, are glaffes ground either convex or concave, in order either to collect or difperfe the rays of light; by means whereof vifion is improved, and the eye ftrengthened and preferved.

Optick *Inequality*, in aftronomy, is the apparent irregularity in the motion of far diftant bodies; fo called, becaufe not really in the moving bodies, but arifing from the fituation of the fpectator's eye: fo that, were the eye in the centre, the motions would always appear uniform.

Optick *Nerves*, the fecond pair of nerves, fpringing partly from the extremity of the corpora ftriata, and partly from the thalami nervorum optici.

Optick *Pencil*, or a *Pencil of Rays*, that affemblage of rays by means whereof any point, or part of an object, is rendered vifible.

Optick *Place* of a planet, &c. is that point or place of its orbit, in which it appears to be to the eye of the obferver.

Optick *Pyramid*, in perfpective, is a pyramid whofe bafe is the vifible object, and its vertex in the eye formed by rays drawn from the feveral points of the perimeter to the eye.

OPTICKS, is that branch of natual philofophy which treats of vifion, and the various phænomena of vifible objects, by rays of light reflected from mirrours, or tranfmitted through lenfes.

Opticks are divided into two parts, catoptricks and dioptricks; the former treats of vifion by light reflected from mirrours, or polifhed furfaces; and the latter of vifion effected by light tranfmitted through lenfes.

But, in a larger fenfe, it may be confidered as comprehending the whole doctrine of light and colours, and all the phænomena of vifible objects. In this large fenfe, the incomparable Sir Ifaac Newton calls his book of light and colours, Opticks.

OPULUS, the water-elder, in botany, a genus of plants, with a monopetalous, campanulated flower, quinquifid at the limb: the fruit is a roundifh unilocular berry, containing a fingle, offeous, and compreffed cordated feed.

OPUNTIA, Indian fig, in botany, a fpecies of cactus, diftinguifhed by being ramofe and dichotomous.

It is on this plant that the cochineal animal feeds.

OR, in heraldry, yellow, or the colour of gold. Without this colour, or that of argent or filver, there can be no good armoury. In the coats of noblemen it is called topaz; and, in thofe of fovereign princes, fol. It is reprefented, in engraving, by fmall points or dots, all over the field or bearing. It is accounted a fymbol of wifdom, temperance, faith, force, conftancy, &c.

ORACLE, among the heathens, was the anfwer which the gods were fuppofed to give to thofe who confulted them upon any affair of importance; it is alfo ufed for the god who it was thought gave the anfwer, and the place where it was given.

The credit of oracles was fo great, that in all doubts and difputes their determinations were held facred and inviolable; whence vaft numbers flocked to them for advice about the management of their affairs; and no bufinefs of any confequence was undertaken, fcarce any peace concluded, any war waged, or any new form of government inftituted, without the advice and approbation of fome oracle. The anfwers were ufually given by the intervention of the prieft or priefteſs of the god who was confulted, and generally expreffed in fuch dark and indeterminate phrafes, as might eafily be wrefted to prove the truth of the oracle, whatever was the event. It is not, therefore, to be wondered at, that the priefts who delivered them were in the higheft credit and efteem; and that they improved this reputation greatly to their advantage. They accordingly allowed no man to confult the gods, before he had offered coftly facrifices, and made rich prefents to them. And to keep up the veneration for their oracles, and to prevent their being taken unprepared, they admitted perfons to confult the gods only at certain ftated times; and fometimes they were fo cautious, that the greateft perfons could obtain no anfwer at all. Thus Alexander himfelf was peremptorily denied by the pythia, or priefteſs of Apollo, till fhe was, by downright force, obliged to afcend the tripos; when, being unable to refift any longer, fhe cried out, "Thou art Invincible;" and thefe words were accepted inftead of a further oracle.

ORANGE, the name of a fruit too well known to need any defcription here. There are feveral kinds of orange-trees, as the Seville, the China, the Shaddock, the dwarf, or nutmeg, the curled leaved, the ftriped curled leaved, the double flowering, and the large warted orange, with other varieties cultivated in England, but rather for curiofity than ufe.

The juice of the orange is fharp, becaufe this falt is but little embarraffed with the ropy parts; which is the reafon it communicates almoft all its acidity to the little nervous fibres of the tongue. As for the juice of the fweet oranges, as it contains lefs falt than that of the four ones, and as this falt is kept under by a great quantity of oily parts, it is eafy to be underftood that it can make but a flight impreffion on the parts it touches.

They prefer the juice of the four orange in medicinal ufe to the other, as we before obferved, for cooling, moiftening, and mitigating fevers; becaufe this juice has more of the acid in it, and can more eafily thicken the overthined liquors, allay their violent motions, and keep down thofe fharp humours that throw them into an extraordinary fermentation.

Orange *Colour*, a colour formed with red and yellow.

ORANGERY, among gardeners, a green-houfe, adapted folely to the prefervation of orange trees during the winter.

ORATION, in rhetorick, a fpeech or harangue, compofed according to the rules of oratory, and delivered in publick.

ORATORY, the art of fpeaking with propriety, and according to the rules of rhetorick. See Rhetorick.

ORB, *Orbis*, in aftronomy, a hollow globe or fphere.

ORBIS Magnus, in aftronomy, fignifies the earth's orbit, or the path that planet defcribes in its annual courfe round the fun.

ORBIT, *Orbita*, in aftronomy, the path defcribed by a planet about the fun. The orbits of all the planets are ellipfes, having the fun in their common focus; but the elliptick orbit of the earth, by the action of the moon, is fenfibly disfigured, as alfo the orbit of Saturn by the action of Jupiter, when they are in conjunction. See Planet.

ORCHARD, a plantation of fruit-trees. It is a rule among gardeners, that thofe orchards thrive beft which lie open to the fouth, fouth-weft, and fouth-eaft, being fcreened from the north, and have the foil dry and deep.

In planting of an orchard, great care fhould be had to the nature of the foil, that fuch trees as are adapted to grow upon the ground intended to be planted, may be chofen, otherwife there can be little hopes of their fucceeding; and it is for want of rightly obferving this method, that we fee, in many countries, orchards planted which never arrive to any tolerable degree of perfection, their trees ftarving, and their bodies either covered with mofs, or the bark cracks and divides; both which are evident figns of the weaknefs of the trees; whereas, if inftead of apples, the orchard had been planted with pears, cherries, or any other fort of fruit to which the foil had been adapted, the trees might have grown very well, and produced great quantities of fruit.

As to the pofition of the orchard, if you are at full liberty to chufe, a rifing ground, open to the fouth-eaft, is to be preferred; but we would by no means advife to plant upon the fide of an hill, where the declivity is very great; for in fuch places the great rains commonly wafh down the better part of the ground, whereby the trees would be deprived of proper nourifhment; but where the rife is gentle, it is of great advantage to the trees, by admitting the fun and air between them, better than it can upon an entire level; which is an exceeding benefit to the fruit, by diffipating fogs, and drying up the damps, which, when detained amongft the trees, mix with the air, and render it rancid; if it be defcended from the weft, north, and eaft winds, it will alfo render this fituation ftill more advantageous; for

for it is chiefly from these quarters that fruit-trees receive the greateſt injury: therefore, if the place be not naturally defended from theſe by riſing hills, which is always to be preferred, then you ſhould plant large growing timber-trees at ſome diſtance from the orchard, to anſwer this purpoſe.

You ſhould alſo have a great regard to the diſtance of planting the trees, which is what few people have rightly conſidered; for if you plant them too cloſe, they will be liable to blights; and the air, being hereby pent in amongſt them, will cauſe the fruit to be ill-taſted, having a great quantity of damp vapours from the perſpiration of the trees, and the exhalations from the earth mixed with it, which will be imbibed by the fruit, and render their juices crude and unwholeſome.

Wherefore we cannot but recommend the method which has been lately practiſed by ſome particular gentlemen with very great ſucceſs; and that is, to plant the trees fourſcore feet aſunder, but not in regular rows. The ground between the trees they plough, and ſow with wheat and other crops, in the ſame manner as if it were clear from trees; and they obſerve their crops to be full as good as thoſe quite expoſed, except juſt under each tree, when they are grown large, and afford a great ſhade; and, by thus ploughing and tilling the ground, the trees are rendered more vigorous and healthy, ſcarcely ever having any moſs, or other marks of poverty, and will abide much longer, and produce better fruit.

If the ground in which you intend to plant an orchard has been paſture for ſome years, then you ſhould plough in the green ſward the ſpring before you plant the trees: and, if you will permit it to lie a ſummer fallow, it will greatly mend it, provided you ſtir it two or three times, to rot the ſward of graſs, and prevent weeds growing thereon.

At Michaelmas you ſhould plough it pretty deep, in order to make it looſe for the roots of the trees, which ſhould be planted thereon in October, provided the ſoil be dry; but, if it be moiſt, the beginning of March will be a better ſeaſon.

When you have finiſhed planting the trees, you ſhould provide ſome ſtakes to ſupport them, otherwiſe the wind will blow them out of the ground; which will do them much injury, eſpecially if they have been planted ſome time; for, the ground at that ſeaſon being warm, and for the moſt part moiſt, the trees will very ſoon puſh out a great number of young fibres; which if broken off by their being diſplaced, will greatly retard the growth of them.

In the ſpring following, if the ſeaſon ſhould prove dry, you ſhould cut a quantity of green turf, which muſt be laid upon the ſurface of the ground about their roots, turning the graſs downward; which will prevent the ſun and wind from drying the ground, whereby a great expence of watering will be ſaved: and, after the firſt year, they will be out of danger, provided they have taken well.

Whenever you plough the ground between theſe trees, you muſt be careful not to go too deep among their roots, leſt you ſhould cut them off, which would greatly damage the trees: but, if you do it cautiouſly, the ſtirring of the ſurface of the ground will be of great benefit to them; though you ſhould obſerve never to ſow too near the trees, nor ſuffer any great rooting weeds to grow about them, which would exhauſt the goodneſs of the ſoil, and ſtarve them.

If, after the turf which was laid round the trees be rooted, you dig it in gently about the roots, it will greatly encourage them. There are ſome perſons who plant many ſorts of fruit together in the ſame orchard, mixing the trees alternately; but this is a method which ſhould always be avoided; for hereby there will be a very great difference in the growth of the trees, which will not only render them unſightly, but alſo the fruit upon the lower trees ill-taſted, by the tall ones overſhadowing them; ſo that, if you are determined to plant ſeveral ſorts of fruit on the ſame ſpot, you ſhould obſerve to place the largeſt growing trees backwards, and ſo proceed to thoſe of leſs growth, continuing the ſame method quite through the whole plantation; whereby it will appear at a diſtance in a regular ſlope, and the ſun and air will more equally paſs through the whole orchard, that every tree may have an equal benefit therefrom.

The ſoil of your orchard ſhould alſo be mended once in two or three years with dung, or other manure, which will alſo be abſolutely neceſſary for the crops ſown between; ſo that where perſons are not inclinable to help their orchard, where the expence of manure is pretty great; yet, as there is a crop expected from the ground beſides the fruit, they will the more readily be at the charge upon that account.

In making choice of trees for an orchard, you ſhould always obſerve to procure them from a ſoil nearly a-kin to that where they are to be planted, or rather poorer; for, if you have them from a very rich ſoil, and that wherein you plant them is but indifferent, they will not thrive well, eſpecially for four or five years after planting: ſo that it is a very wrong practice to make the nurſery, where young trees are raiſed, very rich, when the trees are deſigned for a middling or poor ſoil. The trees ſhould alſo be young and thriving; for whatever ſome perſons may adviſe to the contrary, yet it has always been obſerved, that though large trees may grow, and produce fruit, after being removed, they never make ſo good trees, nor are ſo long-lived, as thoſe which are planted while young. *Millar's Gardener's Dictionary.*

ORCHESTRA, in the ancient theatres, a place in the form of a ſemi-circle, where the dancing was performed. At preſent it ſignifies the place where the muſicians ſit.

ORCHIS, in botany, a genus of plants whoſe flower hath five petals with a nectarium of a corinculated form, with two very ſhort ſlender filaments joining to the pointal, with oval erect antheræ. The fruit is an oblong unilocular capſule, with three carinated valves opening on the ſides, but cohering at the top and bottom. The ſeeds are numerous, and extremely ſmall.

ORDEAL, an ancient form of trial, practiſed in England till the reign of Henry III.

The ordeal was of various kinds, as of fire, of red-hot iron, cold water, &c. and, if the perſon ſuſpected remained unhurt after this trial, he was declared innocent.

ORDER, in architecture, conſiſts of two principal members, the COLUMN and the ENTABLATURE; each of which is compoſed of three principal parts. Thoſe of the Column are, the *Baſe*, the *Shaft*, and the *Capital*; and thoſe of the entablature are, the *Architrave*, the *Frieze*, and the *Cornice*. All theſe are ſubdivided into many leſs parts, whoſe number, form, and dimenſions characteriſe each order, and expreſs the degree of ſtrength delicacy, richneſs, or ſimplicity peculiar to it.

The Tuſcan ORDER is the firſt, moſt ſimple and ſolid; its column is ſeven diameters high, and its capital, baſe, and entablature, have but few mouldings for ornaments.

If we give credit to M. de Cambray in his Parallel, this order ought never to be uſed any where but in ruſticks or country houſes and places. See TUSCAN *Ord.*

The Dorick ORDER is the ſecond and moſt agreeable to nature. It is the moſt ancient, and given us by the Greeks; it has no ornament on its baſe, or on its capital. Its height is eight diameters. Its frieze is diſtinguiſhed by triglyphs and metopes. Its compoſition is grand and noble, and the triglyphs which make the ornaments of its frieze, bearing ſome reſemblance to a lyre, ſeem to intimate it to have been originally intended for ſome temple conſecrated to Apollo. See DORICK *Order.*

The Ionick ORDER is the third, and a kind of mean proportional between the ſolid and delicate orders. Its capital is adorned with volutes, and its cornice with denticles. See IONICK *Order.*

The Corinthian ORDER, invented by Callimachus, is the fourth, the richeſt and the moſt delicate. Its capital is adorned with two rows of leaves, and eight volutes, which ſuſtain the abacus. Its column is ten diameters high, and its cornice has modillons. See CORINTHIAN *Order.*

The Compoſite or *Roman* ORDER is the fifth and laſt (though Scammozzi makes it the fourth.) It is called the Compoſite, becauſe its capital is compoſed out of thoſe of the other orders; having two rows of leaves of the Corinthian, and the volutes of the Ionick. It is alſo called the Roman, becauſe invented among that people. Its column is 10 diameters high, and its cornice has denticles or ſimple modillons. See COMPOSITE *Order.*

Ruſtick ORDER, is that adorned with ruſtick quoins, boſſages, &c.

Attick ORDER, is a little order of low pilasters, with an architraved cornice for its entablature, as that of the castle of Versailles, over the Ionick, on the side of the garden. M. Blondel calls the little pilasters of Atticks and Mezzanines false orders.

Persian ORDER, is that which has figures of Persian slaves, instead of columns, to support the entablature.

Caryatick ORDER, is that whose entablature is supported with figures of women instead of columns.

Gothick ORDER, is an order which deviates from the ornaments and proportions of the antique; and whose columns are either too massive, in manner of pillars; or too slender, like poles; its capitals out of all measure; and carved with leaves of wild acanthus, thistles, cabbage, or the like.

French ORDER, is a new contrived order, wherein the capitals consist of attributes agreeing to that people, as cocks heads, flowers de lis, &c. The proportions of this order are Corinthian. Such is that of M. Le Brun, in the grand gallery of Versailles, and that of M. Le Clerc.

M. Le Clerc gives a second Tuscan order and a Spanish order, besides his French order. The Tuscan he ranks between the first Tuscan and Dorick. He makes the height of it 23 semi-diameters, 22 minutes; the columns to have 15, the pedestal 5, and the entablature 3 and 22 minutes; and he proposes its frieze to be adorned with turtles, which are the arms of Tuscany. He places the Spanish order between the Corinthian and Composite. He makes the whole order 30 semi-diameters, 28 minutes; the column of which has 19 and 25 minutes, the pedestal 16 and 18 minutes, and the entablature 4 and 15 minutes. The horns of the abacus he sustains with little volutes; the middle, in lieu of a rose, has a lion's snout; that animal being the symbol of Spain, and expressing the strength, gravity, and prudence of that nation.

Holy ORDERS, a character peculiar to ecclesiasticks, whereby they are set apart for the ministry.

Military ORDERS, are companies of knights, instituted by kings and princes; either for defence of the faith, or to confer marks of honour, and make distinctions among their subjects.

Religious ORDERS, are congregations or societies of monasticks, living under the same superior, in the same manner, and wearing the same habit.

ORDINANCE, or ORDONNANCE, a law statute, or command of a sovereign, or superior: thus the acts of parliament are sometimes termed ordinances of parliament.

ORDINARY, or HONOURABLE ORDINARY, in heraldry, a denomination given to certain charges properly belonging to that art. The honourable ordinaries are 10 in number, viz. the chief, pale, bend, fesse, bar, cross, saltier, chevron, bordure, and orle.

ORDINATES, or ORDINATE APPLICATES, in geometry, are parallel lines, terminating in a curve, and bissected by a diameter. The half of these is properly the semi-ordinate, though commonly called ordinate. See CURVE, PARABOLA, HYPERBOLA, &c.

ORDINATION, the act of conferring holy orders, or of initiating a person into the priesthood by prayer, and the laying on of hands. Ordination has always been esteemed the principal prerogative of bishops, and they still retain the function as a mark of spiritual sovereignty in their diocese. Without ordination, no person can receive any benefice, parsonage, vicarage, &c. A clerk must be 23 years of age before he can have any share in the ministry; and 24, before he can be ordained, and by that means be permitted to administer the sacraments. A bishop on the ordination of clergymen, is to examine them in the presence of the ministers who assist him at the imposition of hands; and in case any crime, as drunkenness, perjury, forgery, &c. be alledged against any one that is to be ordained, either priest or deacon, the bishop ought to desist from ordaining him. The person to be ordained is to bring a testimonial of his life and doctrine to the bishop, and give an account of his faith in Latin, and both priests and deacons are obliged to subscribe the 39 articles.

ORDNANCE, a general name for all sorts of great guns used in war. See CANNON.

ORDONNANCE, in painting, is used for the disposition of the parts of a picture, either with regard to the whole piece, or to the several parts; as the groups, masses, contrasts, &c.

ORDONNANCE, in architecture, is the composition of a building, and the disposition of its parts, both with regard to the whole, and to one another; or, as Mr. Evelyn expresses it, determining the measure of what is assigned to the several apartments.

ORE, in natural history, the mineral glebe, earth or stone dug out of the mines, to be purified, and have the metalline particles separated from it.

ORGAN, in general, is an instrument or machine designed for the production of some certain action or operation; in which sense, the mechanick powers, machines, and even the veins, arteries, nerves, muscles, and bones of the human body, may be called organs.

The organs of sense are those parts of the body, by which we receive the impressions or ideas of external objects; being commonly reckoned five, viz. the eye, ear, nose, palate, and cutis.

ORGAN, in musick, the largest and most harmonious wind-instrument. The invention of the organ is very ancient, though it is agreed that it was very little used till the eighth century. It seems to have been borrowed from the Greeks. Vitruvius describes an hydraulick one in his 10th book of architecture.

St. Jerome mentions one with 12 pair of bellows, which might be heard a thousand paces, or a mile; and another at Jerusalem, which might be heard at the Mount of Olives. There is one in the cathedral church of Ulm, in Germany, that is 93 feet high; and 28 broad; the biggest pipe is 13 inches in diameter, and it has 16 pair of bellows.

The organ has at least one set of keys, when it has only one body, and two or three when it has a positive or chair-organ: though large organs have four, and sometimes five sets of keys; besides which, the pedals or largest pipes have their keys, the stops or touches whereof are played by the feet. The keys of an organ are usually divided into four octaves, viz. the second sub-octave, first sub-octave, middle octave, and first octave. Each octave is divided into 12 stops or frets, whereof the several black ones mark the natural sounds, and the five white, the artificial ones, that is, the sharps and flats; so that the keys usually contain 48 stops, or touches. Some organists add to this number one or more stops in the third sub-octave as well as in the second. Note, some harpsichords and spinnets have their natural stops or keys often marked white, and their artificial ones black. The pedals have about two or three octaves, at the pleasure of the organist, so that the number of stops is indeterminate.

Each key or stop pressed down, opens a valve or plug which corresponds lengthwise with as many holes as there are rows of pipes on the sound-board: the holes of each row are opened and shut by a register, or ruler pierced with 48 holes; by drawing the register, the holes of one row are opened, because the holes therein correspond with those of the sound-board, so that by opening a valve, the wind brought into the sound-board, by a large pair of bellows, finds a passage into the pipes, which correspond to the open holes of the sound-board; but by pushing the register, the 48 holes thereof not answering to any of those of the sound-board, that row of pipes answering to the pushed register are shut. Whence it follows, that by drawing several registers, several rows of pipes are opened; and the same thing happens, if the same register correspond to several rows. Hence the rows of pipes become either simple or compound: simple, when only one row answers to one register; compound, where several. The organists say, a row is compound, when several pipes play upon pressing one stop.

ORGANICAL, in the ancient musick, implied that part performed by instruments.

ORGANICAL *Part*, that part of an animal, or plant, destined to perform some particular function.

ORGANICAL *Disease*, a disease in the organical part of the body, whereby its function is impeded, suspended, and destroyed.

ORGANICAL *Description of Curves*, the method of describing them on a plane by the help of instruments. See CURVE.

ORGASM, in medicine, a violent turgency and motion of the humours.

ORGIA,

ORGIA, in antiquity, feafts and facrifices performed in honour of Bacchus, inftituted by Orpheus, and chiefly celebrated on the mountains by wild diftracted women, called Bacchæ.

ORGUES, in the military art, thick long pieces of wood pointed and fhod with iron, and hung each by a feparate rope over the gateway of the place, ready on any furprize, or attempt of the enemy, to be let down, to ftop up the gate.

ORGUES, is alfo ufed to fignify a machine compofed of feveral mufket-barrels, bound together; by means whereof feveral bullets are fired at the fame time; ufed to defend breaches, and other places attacked.

ORGYIA, an ancient Grecian long meafure, containing fix feet.

ORIENT, in geography and aftronomy, the eaft, or eaftern point of the horizon.

ORIENTAL, fomething fituated towards the eaft, with regard to us, or fomething brought from thence.

ORIFICE, *Orificium*, the mouth or aperture of a tube, pipe, veffel, or other cavity.

Orifice is alfo ufed to fignify the aperture of a wound or ulcer.

ORIGANUM, wild majoram, in botany, a plant with firm round ftalks, and oval, acuminated, uncut, fomewhat hairy leaves, fet in pairs upon fhort pedicles: on the tops grow fcaly heads of pale red labiated flowers, whofe upper lip is entire, and the lower cut into three fegments, fet in form of a convex umbel, intermixed with roundifh purplifh leaves; each flower is followed by four minute feeds inclofed in the cup. It grows wild on dry chalky hills and gravelly grounds, in feveral parts of England, and flowers in June. The flowers, or rather flowery tops, of a fomewhat different fpecies, Origanum Creticum, were formerly brought from Candy, but have long given place to thofe of our own growth, which are nearly of the fame quality.

The leaves and flowery tops of origanum have an agreeable aromatick fmell, and a pungent tafte, warmer than that of the garden marjoram, and much refembling thyme; with which they appear to agree in medicinal virtue. Infufions of them are fometimes drank as tea, in weaknefs of the ftomach, diforders of the breaft, for promoting perfpiration and the fluid fecretions in general; they are fometimes ufed alfo in nervine and antirheumatick baths; and the powder of the dried herb as an errhine. Diftilled with water, they yield a moderate quantity of a very acrid penetrating effential oil, fmelling ftrongly of the origanum, but lefs agreeable than the herb itfelf: this oil is applied on a little cotton for eafing the pains of carious teeth; and fometimes diluted and rubbed on the noftrils or fnuffed up the nofe, for attenuating and evacuating mucous humours.

ORIGENISTS, in church hiftory, a Chriftian fect in the fourth century, fo called from their drawing their opinions from the writings of Origen. The Origenifts maintained, that the fouls of men had a pre-exiftent ftate, that they were holy intelligences, and had finned in heaven before the body was created: that Chrift is only the Son of God by adoption; that he has been fucceffively united with all the angelical natures, and has been a cherub, a feraph, and all the celeftial virtues, one after another; that in future ages, he will be crucified for the falvation of the devils, as he has already been for that of men; and that their punifhment, and that of the damned, will continue only for a certain limited time.

ORIGINAL, a firft draught, defign, or autograph, of any thing, ferving as a model to be imitated or copied.

ORIGINAL *Sin*, that crime we became guilty of at our birth, by the imputation of Adam's difobedience.

ORIGINALIA, in the exchequer, are records or tranfcripts fent to the remembrancer's office, out of chancery.

ORILLON, in fortification, a fmall rounding of earth, lined with a wall, raifed on the fhoulder of thofe baftions that have cafemates, to cover the cannon in the retired flank, and prevent their being difmounted by the enemy.

ORION, in aftronomy, one of the conftellations of the fouthern hemifphere. The number of ftars in this conftellation, in Ptolemy's catalogue is 37, in Tycho's 62, and in Mr. Flamftead's 80.

ORLE, ORLET, or ORLO, in architecture, a fillet under the ovolo, or quarter round of a capital.

ORLE, in heraldry, is an ordinary in form of a fillet, drawn round the fhield, near its edge or extremity, leaving the field vacant in the middle.

ORLOPE, or ORLOP, in a fhip of war, the platform or deck, below the lower gun-deck, where the cables are ftowed, and the midfhipmen have their births.

ORNITHOLOGY, that branch of natural hiftory which relates to birds, their natures, kinds, &c.

ORNITHOMANCY, a kind of divination, or foretelling future events, by means of birds.

OROBANCHE, BROOM-RAPE, in botany, a genus of the didynamia-angiofpermia clafs of plants, the corolla of which is monopetalous and ringent; and its fruit an oblong capfule formed of two valves, and containing a great many minute feeds. The leaves of this plant, dried, and reduced to a powder, afford great relief in extreme pains of the cholick; and its firup is recommended againft the hypochondriack affection.

ORPHAN, a child, or minor, deftitute of a father; or that has neither father nor mother.

ORPIMENT, in natural hiftory, one of the moft beautiful foffils we know, when it is pure; but it is much more frequently met with mixed and blended in fmall flakes, among a folid fubftance approaching to its own nature, but without its luftre or foliated texture.

The principal ufe of orpiment is as a colouring drug among the painters, being of a beautiful gold colour.

ORRERY, a very curious machine for reprefenting to the eye the motions of the heavenly bodies, according to the Copernican fyftem.

The ancients were no ftrangers to machines of this kind, though perhaps they wanted that perfection to which the moderns have carried them. The firft we have any mention of is that of Archimedes, generally called Archimedes's fphere; though it was more than what we now-a-days call a fphere, which is an inftrument confifting only of large and fmall circles artfully put together; but this famous machine of Archimedes was of a more complex nature, and confifted of a fphere; not of circles, but of an hollow globular furface of glafs, within which was a piece of mechanifm to exhibit the motions of the moon, the fun, and the five planets.

This machine appears from hence to have been fufficiently grand and univerfal, as comprehending all the heavenly bodies, and exhibiting all their proper motions; which is all that can be faid of our common modern orreries. It is true, this orrery of Archimedes was contrived to reprefent the Ptolemaick fyftem; but the mechanifm and nature of the inftrument is the fame, whether the fyftem of Ptolemy, or Copernicus, or any other be reprefented by it.

The next orrery we have any mention of is that of Pofidonius the ftoick, in Cicero's time, 80 years before our Saviour's birth: concerning which the orator, in his book De Nat. Deorum, has the following paffage: "Quid fi in Scythiam, aut in Britanniam, fphæram "aliquis tulerit hanc, quam nuper familiaris nofter "effecit Pofidonius, cujus fingulæ converfiones idem "efficiunt in fole, & in luna, & in quinque ftellis erran-"tibus, quod efficitur in cœlo fingulis diebus & noctibus; "quis in illa barbarie dubitet, quin ea fphæra fit per-"fecta ratione?" That is, If any man fhould carry this fphere of Pofidonius into Scythia or Britain, in every revolution of which the motions of the fun, moon, and five planets, were the fame as in the heavens each day and night, who in thofe barbarous countries could doubt of its being finifhed (not to fay actuated) by perfect reafon?—What can be a more genuine account of a compleat orrery than this? And, by the way, what would Cicero fay, were he now to rife from the grave, and fee his barbarous Britain abounding in orreries of various kinds and fizes?

From this time we hear no more of orreries and fpheres, till about five hundred and ten years after Chrift, when the famous Severinus Boethius, the Chriftian, though Roman philofopher, is faid to have contrived one, which Theodorick king of the Goths wrote to him about, and defired it for his brother-in-law Gundibald king of Burgundy; in which letter he calls it Machinam mundo gravidam,—cœlum geftabile,—rerum compendium: that is, a machine pregnant with the univerfe,—a portable heaven,—a compendium of all things. What more can be faid of our orreries?

After

After this succeeded a long interval of barbarism and ignorance, which so deluged the literary world, that we find no instance of mechanism of any note till the sixteenth century, when the sciences began again to revive, and the mechanical arts to flourish. Accordingly we meet with many pieces of curious workmanship about this time; and, in the astronomical way particularly, is the stately clock in his majesty's palace at Hampton-Court, made in Henry the Eighth's time, A.D. 1540, by one N. O. This shews not only the hour of the day, but the motion of the sun and the moon through all the signs of the zodiack, with other matters depending thereon; and is therefore to be esteemed a piece of orrery-work.

Such another is mentioned by Heylin, at the cathedral church of Lunden in Denmark; but the most considerable at this time, is that piece of clock-work in the cathedral of Strasburg in Alsace; in which, besides the clock-part, is the celestial globe or sphere, with the motions of the sun, moon, planets, and fixed stars, &c. It was finished in the year 1574, and is much superior to that pompous clock at Lyons, which also contains an orrery part.

About the beginning of the seventeenth century, this sort of mechanism began to be greatly in vogue, and spheres and orreries were now no uncommon things, though orreries bore an excessive price till very lately. The first large one made in London by Mr. Rowley was purchased by king George I. at the price of 1000 guineas; nor has any of that large sort, which contains all the movements of primaries and secondaries, been sold for less than 300l. at any time since.

There have been various forms invented for this noble instrument, two of which have principally obtained, viz. the hemispherical orrery, and the whole sphere; though the orrery at first was made without any sphere, and with only the sun, and the earth, and the moon revolving about it; but this was too imperfect a state, and they soon began to invest it, some with a half sphere, some with a whole or complete sphere; for otherwise it could not be an adequate representation of the solar system.

The hemispherical orrery has been made in greater numbers than any other, on account of their being made at less expence. This orrery we have given a figure of, (*plate* LXI. *fig.* 1.) It is composed of an ebony frame about four feet diameter, that contains the wheel-work, &c. for the regulation of the whole machine; adorned with twelve curious pilasters on the outside; between which are neatly painted the twelve signs of the zodiack: above the frame is a broad ring, supported by twelve pillars, and representing the plane of the ecliptick; upon which are two scales of degrees, and between those the names and characters of the twelve signs. And near the outside is a scale of months and days, exactly corresponding to the sun's place at noon, each day in the year. Above this ring stand some of the principal circles of the sphere, according to their respective situations in the heavens. Thus 10 are the two colures, divided into degrees and half degrees. 11 is one half of the equinoctial circle, making an angle with the ecliptick of $23\frac{1}{2}$ degrees. The tropick of cancer, and the arctick circle, are each fixed parallel, and at their proper distance from the equinoctial. On the northern half of the ecliptick is a brass semicircle, moveable upon two points fixed in ♈ and ♎; which semicircle serves as a moveable horizon, to be put to any degree of latitude upon the N. part of the meridian. And the whole machine may be set to any latitude, without disturbing any of the inside motions, by two strong hinges. 13, fixed to the bottom frame, upon which the instrument moves; and a strong brass arch having holes at every degree, through which a strong pin is to be put, according to the elevation. For by these means, and the strength of two men, each taking hold of two handles, the machine is conveniently raised and fixed at any latitude. When the machine is set to the latitude required, the moveable horizon must also be adapted to the same degree upon the meridian, and you may form an idea of the respective altitude, or depressions of the planets, above or below the horizon, according to their respective positions, with regard to the meridian. In the middle of the large circle, designed to represent the ecliptick, is fixed a globe, 1, to represent the sun. Next the sun is a small ball, 2, to represent Mercury. Next to this is Venus, 3, represented by a large ball. And, at a greater distance from the sun, you see the earth, 4, represented by an ivory ball, surrounded, at some distance, by a ring, which expresses the orbit of the moon, making an angle with the circle that represents the ecliptick, and thereby shewing the inclination they have to each other in the heavens, and also the line of the nodes. Within the same ring is another ivory ball, 5, with a black cap or case, to represent the moon; the cap is contrived always to cover that hemisphere, which is turned from the sun, and thereby distinguisheth the enlightened part from the dark side, and, consequently, her age. 6 represents Mars. 7 is Jupiter attended with his satellites, or four moons. And 8, the outmost of all the planets, is Saturn with his ring or belt, and five satellites or moons. All these are fixed upon small stems, which severally represent their axis, each of which hath its peculiar and proper inclination to the plane of that circle which represents the ecliptick.

When the machine is put in motion, all these bodies move round that which represents the sun, and, at the same time, both that, and all those which represent such of the planets as have been observed to have a rotation about their axis, turn round upon the said stems, and in their proper times. The satellites or moons, also, revolve about their primaries at the same time; and the ring that represents the orbit of the moon has likewise its proper motion, whereby that of its nodes is also expressed. The whole machine is put into motion by turning a small winch, 14, like the key of a clock, with very little strength. And, above this winch, is a cylindrical pin, which may be drawn a little out, or pushed in at pleasure: when it is pushed in, all the planets, both primary and secondary, will move according to their respective periods, by turning the handle or winch: when it is drawn out, the motions of the satellites of Jupiter and Saturn will be stopped, while all the rest move freely. In the place of the sun, you may fix a brass lamp, with two convex glasses, made on purpose; which, being placed with the glass directly to the earth, and turning round in the same time with the earth, throws a continual strong light upon it and the moon, in whatever part of its orbit it is; and so not only the times in which the eclipses of the sun and moon will happen, are shewn; but the phænomena themselves are truly represented.

When you propose to use this machine, place a small black patch, or a bit of wafer, upon the middle of the sun, right against the first degree of ♈: you may also place patches upon Venus, Mars, and Jupiter, right against some noted point in the ecliptick; put on the handle, and push in the pin which is just above it. One turn of this handle answers to a revolution of the ball, which represents the earth, about its axis; and, consequently, to 24 hours of time, as may be seen by the motion of the hour index, 9, which is marked, and placed at the foot of the wire, on which the ball of the earth is fixed: again, when the index has moved the space of 10 hours, Jupiter makes one complete revolution round its axis; and so of the rest.

By these means the revolutions of the planets, and their motions round their own axis, will be represented to the eye. And it is worth observation, that the diurnal motion of the planets was discovered, by observing the motions of the spots upon the surface of the sun, and of the planets in the heavens, after the same manner as we here observe the motions of their representatives, by that of the marks placed upon them in this machine.

This machine is so contrived, that the winch may be turned either way; so that, the same number of revolutions being made backwards, they will bring all the planets to their former aspects or situations in respect to each other.

ORTEIL, in fortification, the same with berme. See BERME.

ORTHODOXY, the soundness of doctrine, or belief, with regard to all the points and articles of faith.

ORTHOGONIAL, in geometry, the same with rectangular, or right-angled.

ORTHOGRAPHICK *Projection of the Sphere*, a representation of the several circles of the sphere on a plane, the eye being placed at an infinite distance, vertical to one of the hemispheres. See PROJECTION *of the Sphere.*

ORTHOGRAPHY, in grammar, the art of spelling, that is, of writing words justly, and with their proper and necessary letters.

Orthography, in geometry, the art of drawing or delineating the front plan, or side of an object.

Orthography, in architecture, is the elevation of a building. The orthography is either external or internal.

The external orthography is taken for the delineation of an external face or front of a building; or, as it is by others defined, is the model, platform, and delineation of the front of a house, that is contrived, and to be built by the rules of geometry, according to which pattern the whole fabrick is erected and finished. This delineation or platform exhibits the principal wall, with its apertures, roof, ornaments, and every thing visible to an eye placed before the building.

Internal orthography, which is also called a section, is a delineation, or draught of a building, such as it would appear, were the external wall removed.

Orthography, in perspective, is the front or fore view of any plane; i. e. the side or plane that lies parallel to a straight line, which may be imagined to pass through the outward convex point of the eye, continued to a convenient length.

ORTHOPNOEA, in medicine, a species or degree of asthma, where there is such a difficulty of respiration, that the patient is obliged to sit or stand upright, to be able to breathe. See Asthma.

ORTIVE, in astronomy, signifies eastern; as ortive, or eastern, amplitude is an arch of the horizon, intercepted between the point where the sun or a star rises, and the eastern point of the horizon, or point where the horizon and equator intersect.

ORVIETANUM, in pharmacy, the name of a celebrated antidote, so called, according to Lemery, from Orvieto, a city of Italy, where it was first used; but, according to others, from Hieronymus Ferrantes Orvietanus, a celebrated mountebank, who invented it. The method of preparing this medicine may be seen in Lemery's Pharmacopée.

ORYZA, rice, in botany. See Rice.

OSCILLATION, in mechanicks, the vibration, or reciprocal ascent and descent of a pendulum. See the article Pendulum.

Centre of Oscillation, in a suspended body, is a certain point therein, each vibration whereof is performed in the same manner, as if that point or part alone were suspended at that distance from the point of suspension. Or it is a point, wherein, if the whole length of a compound pendulum be collected, the several oscillations will be performed in the same time as before. Its distance, therefore, from the point of suspension, is equal to the length of a single pendulum whose oscillations are isochronal with those of the compound one.

OSIER, in botany, a species of the salix or willow, much cultivated in moist places, called osier-grounds, for the use of basket-makers, no plant being more pliant for their purpose; they are propagated by cuttings, and are annually cut down, and always kept low: the season for planting the cuttings is in February, and for cutting the twigs in winter.

OSMITES, in botany, a genus of plants, producing compound and radiated flowers; the flowers which compose the disc are hermaphrodite, tubulose, and quinquifid. the female flowers which form the rays, are lanceolated and intire; it hath no pericarpium, but the cup, which is immutable, contains solitary oblong seeds with very little down.

OSMUNDA, in botany, a genus of the cryptogamia filicum class. The spike is full of branches, and the fructification is round. There are 17 species, none of them natives of Britain.

OSSICLE, *Officulum*, a little bone, a diminutive of bone, in which sense it is frequently used by anatomists. Botanists also use officulum for the stone of a plumb, cherry, or any other stone-fruit.

OSSIFICATION, the formation of bones, but more particularly the conversion of parts naturally soft, to the hardness and consistence of bones.

OSTENSIVE Demonstration, that which plainly and directly proves the truth of any proposition.

OSTEOCOLLA, in natural history, a white or ash-coloured sparry substance, shaped like a bone, and by some supposed to have the quality of uniting broken bones, whence the name.

Osteocolla is frequent in many parts of Germany, lying near the surface of the earth, sometimes in strata of sand, but more frequently in marles. That which is found in the earth, is usually of the regular cretaceous kind, and has frequently the remains of sticks, &c. about which it has been formed. This substance has been long famous for bringing on a callus in fractured bones; and the Germans, at this time, frequently give it, where the callus does not seem to form itself so quick as they could wish. It is also recommended as a diuretick, and as good in the fluor albus; but it is entirely neglected with us in the present practice.

OSTEOCOPOS, in medicine, that sort of pain and uneasiness excited by too much motion, generally called a weariness of the bones.

OSTEOLOGIA, a description of the bones; or the doctrine relative to the bones.

OSTRACITES, in natural history, has been used by authors to express the common oyster in its fossile state, under whatever circumstances it has been petrified; but, as the virtues ascribed to it, in medicine, seem to depend on its being either sated with spar, or retaining somewhat of its original testaceous nature; at least, as they are not to be expected in such petrifactions of this shell as are absolutely of the flinty or stony kind; it will be proper to reject all those out of practice. The oyster is not only of several distinct species in its recent state, but every one of those species is liable to many accidental varieties, there being scarce any known shell in which nature sports so much, as to shape, as the oyster kind. Every one of these states of the oyster, as well as each several species, may be buried in the earth, and every one may be petrified there in a different manner. Some of them are found hard, solid, and flinty, others softer and more flaky; these last are to be chosen for use. They will always be known to be oyster-shells by the shape, and the greatest test, for proving them proper for medicinal uses, is, that they burn readily into lime in the fire.

The virtues attributed to the ostracites are the same with those of the belemnites, lapis Judaicus, and the rest of this class; but they stand better recommended than those of any other by a late authority. Dr. Lister has recorded a letter of his friend Dr. Cay, in which that physician declares the ostracites to be, upon his own knowledge, one of the greatest known medicines in nephritick cases. He never gave it, he says, to any that had a confirmed stone, but to such only as were troubled with gravel, or with small stones that might be made to pass, and that almost all he had given it to were cured; some voiding gravel and stones, others not; that it was to be taken a considerable time, in order to have the effect; but that no body he ever cured by it, ever had a return of the same complaint.

This is a very remarkable recommendation of a medicine; and Dr. Lister himself, who also tried it, in a great measure, confirms what his friend says of it. The testimony of two such people may render it worth trying again. The dose is from $\frac{1}{2}$ a drachm to a drachm in white wine. The ostracites is to be reduced to fine powder; and Dr. Cay, to prevent a sickness at the stomach, that sometimes attended the taking it, used to mix it with $\frac{1}{4}$ part of the quantity of powdered chamomile flowers.

Ostracites, is also the name of a kind of cadmia, found at the bottom of furnaces where copper is purified.

OSTRICH, *Struthio*, in ornithology, a distinct genus of birds, having only two toes to each foot, and these are both placed foreward; and its head is simple, or not ornamented with the appendages which are common to most birds of this order. The ostrich is the tallest of all the bird kind, measuring seven or eight feet when it stands erect: its legs are very long and naked; and the structure of the foot, having only two toes, is particular.

The bustard has been confounded with the turkey: it is about the size of the common peacock, and runs at a prodigious rate, being frequently taken with greyhounds in a fair course, in the manner of hunting the hare: its flesh is well tasted.

OSYRIS, poets rosemary, in botany, a genus of plants, without any flower-petals: the fruit is a globose unilocular berry, containing a single osseous seed. This whole shrub is astringent, and consequently good in fluxes.

Osyris

Osyris is also a name sometimes used for the linaria, or toad-flax.

OTHONNA, bastard jacobæa, in botany, a genus of plants, the compound flower of which is radiated with a great number of tubulose and quinquedentated hermaphrodite ones on the disc: the stamina are five very short capillary filaments; and the seed, which is single after each flower, is contained in the cup, and is either naked or crowned with down.

OTTER, *Lutra*, in zoology, a genus of quadrupeds, of the order of the feræ, the characters of which are these: the fore teeth of the upper jaw are strait, distinct, and acute; those of the under jaw are obtuse, and stand close together; the ears are situated lower than the eyes, and the feet are furnished each with five toes, and are palmated or formed for swimming.

Of this genus there are two species. 1. The common otter, with all the toes of an equal length: this is a very fierce animal, three feet in length, including the tail. 2. The Brasilian otter, with the inner toe shorter than all the rest. This is somewhat larger than the former species.

OVAL, an oblong, curvilinear figure, otherwise called ellipsis. See ELLIPSIS. However, the proper oval, or egg shape, differs considerably from that of the ellipsis, being an irregular figure, narrower at one end than at the other: whereas the ellipsis, or mathematical oval, is equally broad at each end; though it must be owned, these two are commonly confounded together; even geometricians calling the oval a false ellipsis.

OVARIES, in anatomy, called, by the earlier writers, testes muliebres, are two bodies of nearly an oval figure; but gibbous on the upper surface, and flat below: they are of a whitish colour and smooth surface, and are annexed, one on each side, to the fundus of the womb.

OVATION, in the Roman antiquity, a less triumph, allowed to commanders for victories won without the effusion of much blood; or, for defeating a mean and inconsiderable enemy. The show generally began at the Albanian mountain, whence the general, with his retinue, made his entry into the city on foot, with many flutes or pipes sounding in concert as he passed along, and wearing a garland of myrtle as a token of peace. The term ovation, according to Servius, is derived from oves, sheep, because on this occasion the conqueror sacrificed a sheep, as in a triumph he sacrificed a bull.

OVEN, a kind of domestick furnace, used for baking bread, pies, tarts, &c. of a circular structure, with a very low roof, well lined, both on the top, bottom, and sides, with stone; it has a small entrance in the front, which is exactly fitted by a kind of door, which being clapped to the mouth of the oven, confines the heat, while bread, pies, or puddings are baking. Over this, pastry-cooks, &c. have another oven built much in the same manner, which is used for such things as require a less degree of heat.

Assaying OVEN, in metallurgy, a particular kind of furnace, used by assayers in their operations upon metals.

OVER, in general, signifies one thing being above another; through, or from, one end to another; beyond, cross, or overthwart; it also denotes excess, &c.

OVER-BLOW, among seamen, is when the winds blow so very hard, that the ship can bear no top-sails.

OVER-FLOWING *of Lands*, among husbandmen, is commonly effected by diverting the streams of rivers, brooks, land-floods, or springs, or some part of them, out of their natural channel; but where streams lie too low for this, they are made use of to turn such engines as may raise a quantity of water to do it. The most useful engine for this purpose is the Persian wheel. See PERSIAN WHEEL.

OVER-RULING *an Objection*, in law, is the rejecting it, or setting it aside by the court.

OVERSEERS *of the Poor*, are publick officers appointed by statute in every parish, to provide for the poor therein; and sometimes there are two, three, or four, according to the largeness of parishes.

OVERSET, or OVERTHROW, in the sea-language. A ship is said to overset, when her keel turns uppermost; which misfortune is occasioned either by bearing too much sail, or by grounding her so that she falls upon one side.

OVERT, the same with open: thus an overt-act signifies an act which, in law, must be clearly proved; and such is to be alledged in every indictment for high treason.

OVERTURE, or OUVERTURE, opening or preluding; a term used for the solemnities at the beginning of a publick act or ceremony; an opera, tragedy, concert of musick, &c. The overture of the theatre, or scene, is a piece of musick usually ending with a fugue; the overture of a jubilee is a general procession, &c.

OVIEDA, in botany, a genus of plants, the corolla whereof is a ringent single petal; the tube of the corolla is very long and small; the upper lip is concave and emarginated; the lower one is divided into three equal segments. The fruit is a globose berry, containing two roundish seeds.

OVIPAROUS, a term applied to such animals as bring forth their young, ab ovo, from eggs; as birds, insects, &c.

OVIS, the sheep, in zoology. See SHEEP.

OUNCE, *Uncia*, a little weight, the sixteenth part of a pound avoirdupois, and the twelfth part of a pound troy: the ounce avoirdupois is divided into eight drachms, and the ounce troy into twenty penny-weights.

OVOLO, or OVUM, in architecture, a round moulding, whose profile, or sweep, in the Ionick and Composite capitals, is usually a quadrant of a circle: whence it is also commonly called the quarter-round. It was usually enriched with sculpture by the ancients, in the form of chesnut-shells; whence Vitruvius and others, called it echinus, i. e. chesnut-shell. See MOULDING.

Among us it is usually cut with the representation of eggs and anchors, or arrow-heads placed alternately.

OUT-HOUSES, are such as belong and are adjoining to dwelling-houses.

OUT-LAND, among the Saxons, was that land that lay beyond the demesness, and was granted out to tenants; though at the will of the lord, in like manner as copyhold estates.

OUT-LAW, signifies one that is deprived of the benefit of the law, and therefore held to be out of the king's protection.

OUTLAWRY, is where a person is autlawed, and on that account loses the benefit of a subject.

OUTLICKER, in a ship, a small piece of timber made fast to the top of the poop, and standing out right a-stern. At the outmost end thereof is a hole, into which the standing part of the sheet is reeved, through the block of the sheet; and then again through another block, which is seized close by the end of this outlicker. It is seldom used in great ships, except the mizen-mast is placed so far aft, that there is not room within-board to hale the sheet flat.

OUTWARD *Flanking Angle*, or *The Angle of the Tenaille*, in fortification, is comprehended by the two flanking lines of defence. See TENAILLE.

OUTWORKS, in fortification, all those works made without-side the ditch of a fortified place, to cover and defend it. These not only serve to cover the body of the place, but also to keep the enemy at a distance, and prevent his taking advantage of the cavities and elevations usually found in the places about the counterscarp, which might serve them either as lodgments, or as rideaux, to facilitate the carrying on their trenches, and planting their batteries against the place.

It is a general rule in all outworks, that if there be several of them, one before another, to cover one and the same tenaille of a place, the nearer ones must gradually one after another, command those that are further advanced out into the campaign, that is, must have higher ramparts, that so they may overlook and fire upon the besiegers, when they are masters of the more outward works.

OWELTY, or OVELTY, *of Services*, in our law-books, denotes an equality of services; as in the case of a lord-mesne, and a tenant who holds the mesne, as he holds of the superior lord.

OWLER, any person who conveys wool, &c. to the sea-side in the night-time, there to be shipped, contrary to law.

OWSE, among tanners, oaken bark beaten or ground small, to serve in the preparation of leather.

OX, *Bos*, in zoology, a genus of quadrupeds, of the order of the pecora, the characters of which are, that the horns

horns are hollow and turned forward, bent like crescents, and smooth on the surface.

Of this genus, authors enumerate the five following species, viz. 1. The common tame kind. 2. The bonasus. 3. The bison. 4. The bubalus. 5. The urus.

Ox-*Gang*, in old law books, signifies 15 acres, being the quantity of land an ox is supposed to be able to plow in a year.

OXYCRATE, *Oxycratum*, in pharmacy, a mixture of water and vinegar.

OXYCROCEUM, in pharmacy, a plaister composed chiefly of saffron and gums dissolved in vinegar.

OXYGONIOUS, in geometry, acute-angled; thus a triangle, whose three angles are acute, is called an oxygonious triangle.

OXYMEL, in pharmacy, a mixture of honey and vinegar, boiled to the consistence of a sirup.

OXYREGMIA, in medicine, a sour or acrid eructation.

OXYRRHODON, a mixture of vinegar and oil of roses.

OXYSACCHARUM, in pharmacy, a medicine composed of vinegar and sugar; commonly called sirup of vinegar.

OYER *and Terminer*, a commission directed to the judges and other gentlemen of the county to whom it is issued, by virtue whereof they are impowered to hear and determine treasons, and all manner of felonies and trespasses.

Oyer *de Record*, a petition made in court, praying the judges, for better proof, will be pleased to hear or look upon any record.

OYES, a corruption of the French oyez, hear ye; being a term, or formula, whereby the criers in our courts injoin silence, or attention, before they make proclamation of any thing.

OYSTER, or Oister, *Ostrea*, in zoology, a genus of bivalve shell-fish, the lower valve of which is hollowed on the inside, and gibbose without; the upper one is more flat; and both are composed of a multitude of laminæ or crusts, and usually scabrous or rough on the outer surface; some oyster shells are also furnished with tubercles, or spines, and others are deeply furrowed and plicated: the figure of most is roundish, but in some it is quite irregular.

Oyster-shells are accounted drying and abstergent, and given internally, sudorifick.

OZENA, a foul malignant ulcer of the nose, which is sometimes so exulcerated as to discharge a fœtid odour, with pieces of corrupted bones.

An ozena is generally more violent and foul, when attended with a caries of the bones; for at first, the internal coat of the nose only is ulcerated, but it extends itself insensibly into the slender bones, and often into the sinuses of the cranium, and the ossa maxillaria, and excites a malignant caries.

It generally arises from an obstinate catarrh, or some other disorder of the nose, especially when the blood is affected with the scurvy, or venereal disease; but sometimes from acrid substances drawn into the nose with the air, and corroding its membrane, as strong strenutatory powders, and sometimes it proceeds from, or is joined by, a polypus.

The external cure should be taken by externals, but more particularly such internal medicines as correct the blood, as antivenereals, of which mercurials and decoctions of the woods are the principal. The patient likewise must be ordered to use a diet moderate and light, neither strong nor light seasoned. When the case is venereal, the best remedy is salivation.

P.

P, The fifteenth letter, and the eleventh consonant of the English alphabet, the sound of which is formed by expressing the breath somewhat more suddenly than in forming the sound of b: in other respects, these two sounds are very much alike, and are often confounded one with another.

When p stands before t or s, its sound is lost, as in the words psalms, psychology, ptolemaick, ptisan, &c. when placed before h, they both together have the sound of f, as in philosophy, physick, &c.

As an abbreviature, P. stands for Publius, pondo, &c. PA. DIG. for patricia dignitas; P. C. for patres conscripti; P. F. for Publii filius; P. P. for propositum, or propositum publice; P. R. for populus Romanus; PR. S. for prætoris sententia; and PRS. P. for præses provinciæ.

In the Italian musick, P. stands for piano, or softly; PP. for piu piano, or more softly; and PPP. for pianissimo, or very softly.

Among astronomers, P. M. is used to denote post meridian, or afternoon; and sometimes for post mane, or after midnight

As a numeral, P. signifies the same as $\bar{G}$, viz. 400; and with a dash over it, thus $\bar{P}$, 400,000.

Among physicians, P. denotes pugil, or the eighth part of a handful; P. Æ. partes æquales, or equal parts of the ingredients; P. P. signifies pulvis patrum, or the Jesuits-powder; and ppt. præparatus, prepared.

PABULUM, fuel, among natural philosophers and chymists. See Fuel and Fire.

PACE, *Passus*, a measure taken from the space between the two feet of a man, in walking; usually reckoned two feet and a half, and in some men, a yard, or three feet. See Measure.

The geometrical pace is five feet; and 60000 such paces make one degree of the equator. See Degree.

PACK, in commerce, denotes a quantity of goods, made up in loads, or bales, for carriage.

A pack of wool is 17 stone and two pounds; being the quantity a horse is supposed to carry.

PACKAGE, a small duty of one penny, paid for all goods not particularly rated.

PACKERS, persons who make it their employment to pack up all goods intended for exportation.

PACT, or Paction, *Pactum*, in law, denotes a contract or agreement between two or more parties. See Contract.

PACTA Conventa, in Poland, are the articles agreed on between the king and the republick, which they mutually oblige each other to observe.

PADDLE, in glass making, an instrument with which the workmen stir about the sand and ashes in the calcar.

PADDOCK, or Paddock-Course, a piece of ground encompassed with pales or a wall, and taken out of a park for exhibiting races with grey-hounds, for plates, wagers, or the like.

PADUS, the bird-cherry, in botany, a genus of plants, whose flower consists of five roundish, concave, patent petals, inserted by their ungues into the edge of the calyx: the fruit is a roundish drupe, inclosing an oval acuminated nut, with rough furrows.

Of this genus the laurel is a species. See Laurus.

The fruit of this plant is recommended to be hung about the necks of children subject to epilepsies. It is of an emollient and heating nature.

PÆAN, among the ancient Pagans, was a song of rejoicing sung in honour of Apollo, chiefly used on occasions of victory and triumph.

PÆDEROTA, in botany, a genus of plants, whose flower is monopetalous, subrotated, quadrifid, and obtuse: the stamina are two slender filaments, topped with connivent antheræ: the fruit is an ovate capsule, with two

two cells, opening at the top, and contains a number of roundish seeds.

PÆDO-BAPTISM, infant baptism, or that conferred on children.

PÆONIA, in botany, a genus of the polyandria digynia class. The calix consists of five leaves, and the corolla of five petals; the stylus is wanting; and the capsule contains many seeds. There are two species, none of them natives of Britain.

The root of this plant is a very celebrated medicine in nervous cases.

PAGAN, *Paganus*, a heathen, gentile, or idolater; one who adores false gods.

PAGANISM, the worship of idols, and other false gods, as practised by the Pagans.

PAGE, a youth of state retained in the family of a prince or great personage, as an honourable servant, to attend in visits of ceremony, do messages, bear up trains, robes, &c. and at the same time to have a genteel education, and learn his exercises. The pages in the king's houshold are various, and have various offices assigned them, as pages of honour, pages of the presence-chamber, pages of the back stairs, &c.

PAGEANT, a triumphal car, chariot, arch, or other like pompous decoration, variously adorned with colours, flags, &c. carried about in publick shews, processions, &c.

PAGNALIA, a rural feast, celebrated in the pagis or villages.

PAGOD, or PAGODA, a name whereby the E. Indians call the temple in which they worship their gods The pagod usually consists of three parts, the first is a vaulted roof supported on stone or marble columns. It is adorned with images, and, being open, all persons without distinction are allowed to enter it: the second part is filled with grotesque and monstrous figures, and no body is allowed to enter but the Bramins themselves: the third is a kind of chancel, in which the statue of the deity is placed: it is shut up with a very strong gate. This word is sometimes used for the idol, as well as for the temple.

PAGOD, or PAGODA, is also the name of a gold and silver coin, current in several parts of the E. Indies.

PAIN, *Dolor*, is defined to be an uneasy sensation, arising from a sudden and violent solution of the continuity, or some other accident in the nerves, membranes, vessels, muscles, &c. of the body; or, according to some, it consists in a motion of the organs of sense; and, according to others, it is an emotion of the soul occasioned by these organs.

Pain may be assuaged by diluting and softening acrimonies with warm water mixed with flour, applied by way of drink, fomentation, clyster, or bath. 2. By resolving and washing away obstructions. 3. By relaxing the nervous vessels. 4. By correcting the acrimony. 5. By freeing the obstruent, obstructed, and acrimonious parts, from the too great pressure of the vital humour, by softening, suppurating, and depurating them; and, lastly, by deadening the sense by narcoticks, either internally or externally.

PAINE FORT ET DURE, in law, an especial punishment for one who, being arraigned of felony, refuses to put himself upon the ordinary trial of God and his country, and thereby stands mute by interpretation of law. This is called pressing to death; the process is thus ordained: the person being sent back to prison, and laid in a low dark house, where he shall lie naked on the earth, only something to cover his privy members; and lying on his back, one arm shall be drawn to one quarter of the house with a cord, and the other arm to another quarter, and his legs in the same manner; let there be laid on his body as much weight as he can bear, or more; next day he shall have three morsels of barley-bread without drink, and the second day he shall have drink three times, as much as he can drink, of the water next unto the prison, except it be running water, without any bread; and this shall be his diet, till he die.

PAINTING, *Pictura*, the art of representing figures, countries, towns, and other things in colours. It is not to be doubted, but that painting is ancient as well as sculpture, but it is hard to know the real time and place where they began to appear. The Egyptians and Greeks, who pretend to be the inventors of those arts which are most for the splendor of life, pretend that they were the first carvers and painters; however, it is certain that painting, after having some weak beginnings, appeared in its perfection amongst the Greeks, and that the principal schools where this art was taught, were at Sicyone, a town of Peloponnesus, at Rhodes, and Athens; from Greece it passed into Italy, where it was in great esteem about the end of the republick, and under the first emperors, until at last, war and luxury having dismembered the Roman empire, it became extinct, as well as other sciences and arts, and did not begin to revive again, till the famous Cimabue laboured at it, and recovered from the hands of certain Greeks some slender remains of this art. Some Florentines, having seconded him, were those that gained most reputation at it, yet it was long before any considerable painting was produced. Le Ghirlandaio, Michael Angelo's master, acquired the most credit; but Michael Angelo, his scholar, in the time of pope Julius II. at the beginning of the 16th century, erected a school at Florence, and with Peter Perugin, and Raphael de Urbin, not only eclipsed the glory of all that went before them, but carried painting to a pitch from which it has ever since been declining. At the same time the school of Lombardy was set up, and was famous under Georgion and Titian, who had Julian Bellino for his master; besides which, there were also in Italy some other particular schools, under different masters; among the rest, that of Leonardo da Vinci at Milan, but the three first are esteemed the most famous, the rest having proceeded from them; but, over and above these, there were on this side the mountains some painters who had nothing to do with those of Italy, as Albert Durer in Germany, Holbens in Swisserland, Lucas in Holland, and several others that wrought in France and Flanders in a different manner; but Italy, and Rome especially, was the place where this art was practised in its greatest perfection, and where from time to time were brought up excellent painters. The school of Raphael was succeeded by that of the Caracchio's, which hath almost lasted till now in its height and perfection; but at this day there is little of it in Italy, this art seeming to have passed into France, since Lewis XIV. set up academies for those that practise it. We have said before, that the first invention of this art of painting is not certainly known; but it is agreed, that he who first attempted drawing, made his first essay upon a wall, by drawing the shadow of a man which the light discovered; and, to give the greater beauty to this story, some write that it was a girl who thus designed the face of her lover. Some alledge that it was one Philocles, of Egypt, who first reduced this invention into practice; others name Cleanthes of Corinth; and others again say, that Ardices, a Corinthian, and Telephanes of Clarentia in Peloponnesus, began to draw without colours, with a coal only; and that the first who made use of one colour in painting, was one Cleophantes of Corinth, and for that reason called Monochromatos: after him, it is said that Higienontes, Dinias, and Charmas, were the first that made pictures in one colour only. Eumarus of Athens, at last, painted both men and women in a different manner; his disciple, Simon, the Cleonian, began to paint the body in various postures, and to represent the joints and limbs, the veins, and the foldings of the drapery; however, it is certain, that in the time of Romulus, and about the 15th olympiad, that is, 715 years before Christ's incarnation, Candaules, firnamed Myrsilus, king of Lydia, bought, for its weight in gold, a picture of Bularchus's painting, in which was represented the battle of the Magnesians. Panæus, the brother of Phidias, was in esteem in the 83d olympiad, 448 years before our Saviour. Polygnotus, the Thasian, was the first that put thought and passion in the face, and gave force and beauty to the colours; he did several things at Delphos and Athens. At the same time Mycon made himself famous also in Greece. About the 90th olympiad appeared Aglaophan, Cephissodorus, Phrillus, and Evenor, the father of Parrhasius; all these painters were excellent in the art, but Apollodorus exceeded them all; he lived in the 93d olympiad, 408 years before the birth of our Lord; his manner was imitated by Zeuxis, Parrhasius, and several others, till the reign of Augustus. It is not known what painters have wrought in Italy since the reign of this emperor. When the Constantines and Theodosii took upon them the pro-

protection of the church, these Christian emperors caused some carving and painting works to be made for the ornaments of the churches, but we have almost nothing considerable of the remains of those pieces. It is probable, one reason of the decay of painting was occasioned by the second council of Nice's decreeing religious worship to be paid to the images of our Saviour and the saints: this practice being looked on by a great part of the church as a dangerous and unwarrantable innovation, several of the Greek emperors made a vigorous opposition against it, and the better to suppress these excesses, ordered the images, &c. to be taken out of the churches and defaced, and by this means the art itself fell under a great discouragement. But, after the year 1270, the famous Cimabue restored the art of painting, which was perfected by the painters of the succeeding age. About the beginning of the 15th century, there were famous painters in the Low Countries, and in Germany.

The art of painting in oil was not however known to the ancients. John Van Eyck, commonly called John de Bruges, was the first who discovered it, and put it in practice, in the beginning of the 14th century: till him, all painters wrought in fresco, or in water-colours.

This was an invention of the utmost advantage to the art; since, by means hereof, the colours of a painting are preserved much longer and better, and receive a lustre and sweetness which the ancients could never attain to, what varnish soever they made use of to cover their pieces.

The whole secret only consists in grinding the colours with nut-oil or linseed-oil: but it must be owned, the manner of working is very different from that in fresco, or in water; by reason the oil does not dry near so fast; which gives the painter an opportunity of touching and retouching all the parts of his figures as often as he pleases; which, in the other kinds, is a thing impracticable.

The figures too are here capable of more force and boldness, inasmuch as the black becomes blacker, when ground with oil than with water; besides that, all the colours, mixing better together, make the colouring sweeter, more delicate and agreeable, and give an union and tenderness to the whole work, inimitable in any of the other manners.

Painting in oil is performed on walls, on wood, canvas, stones, and all sorts of metals.

To paint on a wall. When well dry, they give it two or three washes with boiling oil, till the plaister remain quite greasy, and will imbibe no more. Over this they apply deficcative or drying colours, viz. white chalk, red oker, or other chalks beaten pretty stiff. This layer being well dry, they sketch out, and design their subject; and at last paint it over; mixing a little varnish with their colours, to save the varnishing afterwards.

Others, to fortify their wall better against moisture, cover it with a plaister of lime, marble-dust, or a cement made of beaten tiles soaked with linseed oil; and at last prepare a composition of Greek pitch, mastich, and thick varnish boiled together, which they apply hot over the former plaister: when dry, they lay on the colours as before.

Others, in fine, make their plaister with lime-mortar, tile-cement, and sand; and, this dry, apply another of lime, cement, and iron scum; which, being well beaten and incorporated with whites of eggs and linseed oil, makes an excellent plaister. When dry, the colours are applied as before.

To paint on wood. They usually give their ground a layer of white tempered with size, or they apply the oil above-mentioned; the rest as in painting on walls.

To paint on cloth, or canvas. The canvas being stretched on a frame, they give it a layer of size, or paste-water. When dry, they go over it with a pumice-stone, to smooth off the knots. By means of the size the little threads and hairs are all laid close on the cloth, and the little holes stopped up, so as no colour can pass through.

When the cloth is dry, they lay on oaker, which is a natural earth, and bears a body; sometimes mixing with it a little white lead, to make it dry the sooner. When dry, they go over it with the pumice-stone, to make it smooth.

After this, they sometimes add a second layer composed of white lead, and a little charcoal black, to render the ground of an ash colour; observing in each manner to lay on as little colour as possible; that the cloth may not break, and that the colours, when they come to be painted over, may preserve the better.

In some paintings of Titian and Paolo Veronese, we find they made their ground with water, and painted over it with oil; which contributed much to the vivacity and freshness of their works: for the water ground, by imbibing the oil of the colours, leaves them the more beautiful; the oil itself taking away a deal of their vivacity.

As little oil therefore is to be used as possible, if it be desired to have the colours keep fresh; for this reason some mix them with oil of aspick, which evaporates immediately, yet serves to make them manageable with the pencil.

To paint on stones or metals, it is not necessary to apply size, as on cloth; it suffices to add a slight layer or colours, before you draw your design; nor even is this done, on stones, where it is desired the ground should appear, as on certain marbles of extraordinary colours.

PAINTING *in Enamel*, the art of enamelling, or painting with enamel colours. Under the article ENAMELLING we have described the colours, together with the best methods yet known for laying them on, and burning or baking the plates. We shall here add a representation of the whole process, together with sections, &c. of the furnaces necessary in this method of painting.

Explanation of *plate* LXII. representing the method of painting in enamel. *Upper Compartment.*

Fig. 1. An artist employed in laying on the colours.

Fig. 2. A painter holding the piece to the fire in the furnace, after the colours are laid on.

Plate LXIII. *Lower Compartment.*

Fig. 1. The door of the upper aperture of the enamelling furnace.

Fig. 2. A side view of the muffle on which the plate is placed in the furnace.

Fig. 3. Elevation of the exterior side of the muffle.

Fig. 4. Elevation of the interior side of the muffle.

Fig. 5. A geometrical elevation of the face, or fore-side of the furnace.

Fig. 6. A vertical section of both the body and dome of the furnace, made by a plane passing through the middle of it.

Fig. 7. A vertical section of the furnace, made by a plane passing parallel to the face represented in *fig.* 5.

Fig. 8. Plan of the fire-place of the bottom of the furnace.

Fig. 9. A horizontal section of the furnace, parallel to the former.

Fig. 10. Plan of the dome, or head, of the furnace.

PAIR, *Par*, denotes two equal and similar things joined together, either collectively, as a pair of gloves, or two similar parts that compose one whole, or a set of things joined to make another complete, &c.

PAIR, in anatomy, an assemblage of two nerves, having their origin in the brain or spinal marrow, and thence distributed into the several parts of the body; one on one side, and the other on the other.

PALACE, *Palatium*, the place of residence of kings and other great personages.

PALÆSTRA, in antiquity, was a publick building among the Greeks, where the youth exercised themselves in wrestling, running, quoits, &c.

PALANQUIN, a kind of chaise, or chair, borne by men on their shoulders, much used by the people of China, and the east, as a vehicle for their easy conveyance from place to place.

PALATE, *Palatum*, in anatomy, the flesh that composes the roof, or the upper and inner part of the mouth.

PALE, *Palus*, a little pointed stake or piece of wood, used in making inclosures, separations, &c.

The pale was an instrument of punishment and execution, among the ancient Romans, and still continues so among the Turks. Hence, empaling, the passing a sharp pale up the fundament through the body.

PALE, in heraldry, one of the honourable ordinaries of an escutcheon; being the representation of a pale, or stake, placed upright, and comprehending the whole height of the coat from the top of the chief to the point.

PALED *Flowers*, in botany, are those which have their leaves

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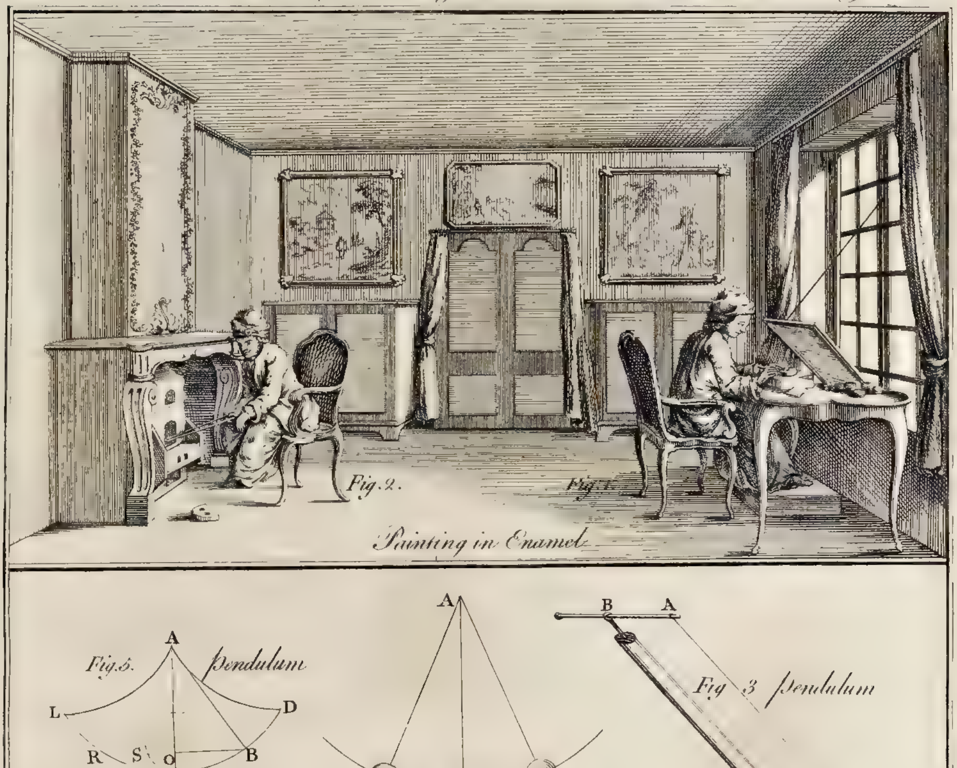


Plate LXII

facing Painting in Enamel.

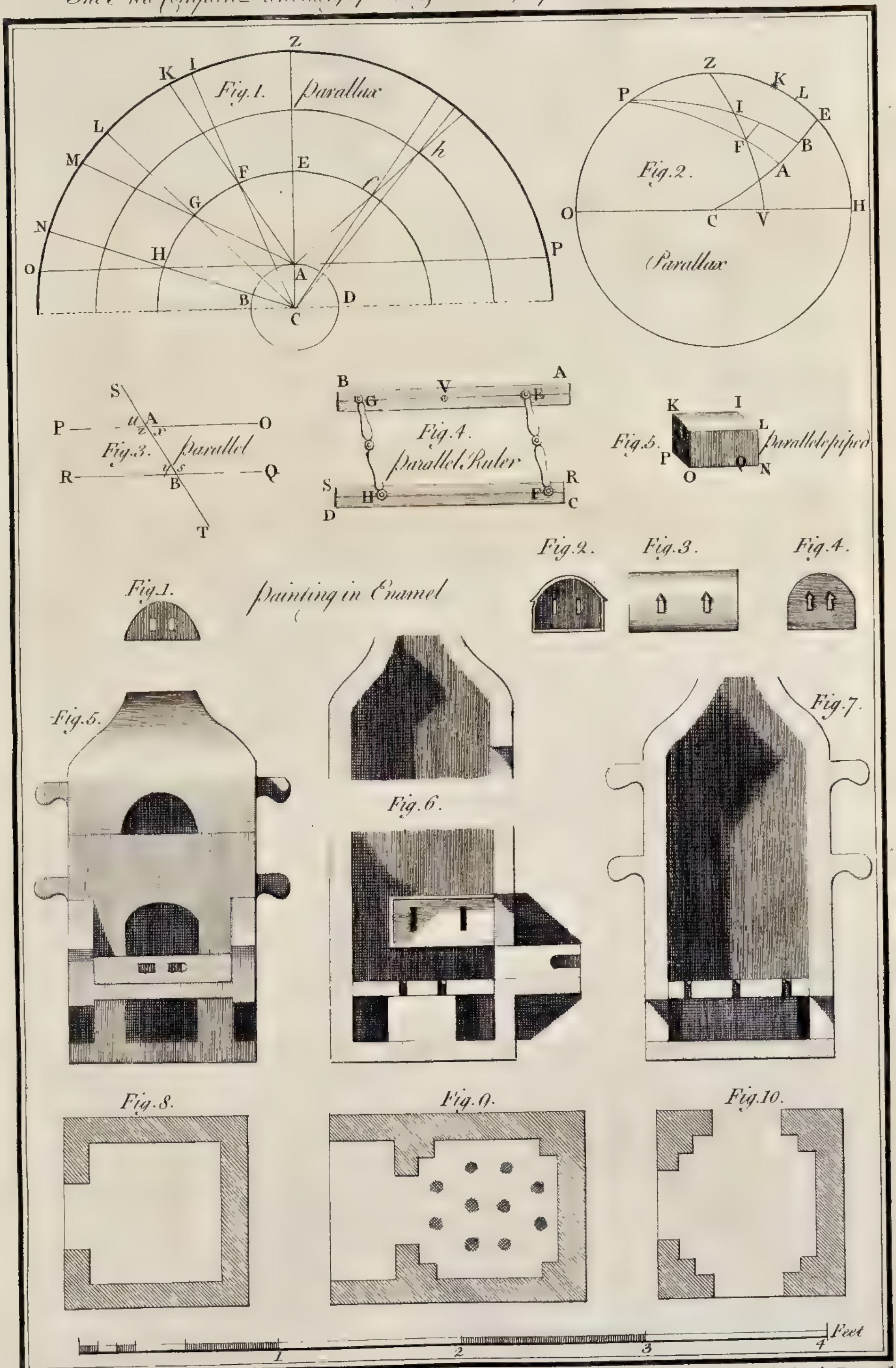


Plate LXIII

facing Painting in Enamel.

leaves ſet about, or ſurrounding, a head of thrum, as in marigolds, &c.

PALES, or *Piles*, in carpentry, denote rows of ſtakes, driven deep into the ground to make wooden bridges over rivers; they ſerve to ſupport the beams laid acroſs them, from one row to another, and are ſtrongly bound with croſs pieces.

PALILICIUM, in aſtronomy, the ſtar called the bull's eye, or aldebaran. See ALDEBARAN.

PALING, a ſort of fencing for fruit-trees planted in fields, wherein three ſmall poſts are erected at a foot and a half diſtance one from another, and near the top nailed to each other with croſs-bars. In fixing the pales in form of a triangle, room is to be left for the tree to play and bow by the high winds, without galling: the trees are to be bound to a ſtake for a year or two, after which, fern or ſtraw may be ſtuffed in betwixt the tree and the uppermoſt rails to keep it upright. If the place be open to deer, rabbits, or the like, a poſt is to be nailed to the bar between every two pales.

PALISADE, or PALISADO, in fortification, an incloſure of ſtakes or piles driven into the ground, each ſix or ſeven inches ſquare, and eight feet long, three whereof are hid under-ground.

Turning-PALISADES, an invention of M. Coehorn, in order to preſerve the paliſades of the parapet of the covert-way from the beſiegers ſhot. He orders them ſo, that as many of them as ſtand in the length of a rod, or in about ten feet, turn up and down like traps, ſo as not to be in ſight of the enemy till they juſt bring on their attack, and yet are always ready to do the proper ſervice of paliſades.

PALISADE, in gardening, denotes a ſort of ornament; being a row of trees which bear branches and leaves from the bottom, cut and ſpread in manner of a wall along the ſide of an alley, or the like, ſo as to appear like a wall covered with leaves.

PALISSE, in heraldry, a bearing like a range of paliſades before a fortification, repreſented on a feſſe, riſing up a conſiderable height, and pointed at top, with the field appearing between them.

PALIURUS, Chriſt's-thorn, in botany, a plant which grows naturally in Paleſtine; it riſes with a pliant ſhrubby ſtalk, to the height of eight or ten feet, ſending out many weak ſlender branches, armed with thorns.

This is by many perſons ſuppoſed to be the plant from which the crown of thorns, put upon the head of our Saviour, was compoſed; the truth of which is ſupported by many travellers of credit, who affirm, that this is one of the moſt common ſhrubs in the country of Judea; and, from the pliableneſs of its branches, which may be eaſily wrought into any figure, it may afford a probability.

This ſhrub alſo grows wild in moſt parts of the Levant, alſo in Italy, Spain, Portugal, and ſouth of France; it is propagated by ſowing its ſeeds, or by laying down its tender branches in the ſpring, which will take root in a year's time.

PALL, in heraldry, denotes a kind of croſs, repreſenting the pallium, or archiepiſcopal ornament ſent from Rome to the metropolitans.

PALLADIUM, in antiquity, a ſtatue of the goddeſs Pallas, ſuppoſed to have dropped down from heaven, preſerved in Troy, whereon the fate of that city is ſaid to have depended.

PALLET, among painters, a little oval table or piece of wood, or ivory, very thin and ſmooth; on, and round which the painters place the ſeveral colours they have occaſion for, to be ready for the pencil. The middle ſerves to mix the colours on, and to make the tints required in the work. It has no handle, but inſtead thereof, a hole at one end to put the thumb through to hold it.

PALLET, among potters, crucible-makers, &c. a wooden inſtrument, almoſt the only one they uſe, for forming, heating, and rounding their works: they have ſeveral kinds, the largeſt are oval, with a handle; others are round, or hollowed triangularly; others are in the form of knives to pare off what is ſuperfluous in their moulds.

PALLET, in gilding, an inſtrument made of a ſquirrel's tail, to take up the gold leaves and extend them on the matter to be gilt.

PALLET, in heraldry, is $\frac{1}{2}$ the breadth of the uſual pale. The pallet muſt never be charged with any thing, nor divided but into four parts; for $\frac{1}{4}$ part of the pallet, or $\frac{2}{8}$ parts of the pale, is called an endorſe.

PALLET, is alſo a part belonging to the balance of a watch or movement.

PALLIATION, the mitigating or diſguiſing of any thing.

PALLIER, or PAILLIER, in architecture, a landing-place in a ſtair-caſe. In large ſtair-caſes, or perrons, where there are ſeveral palliers in the ſame range, they ought, at leaſt, to be the width of two ſteps: thoſe in the turns of ſtair-caſes ſhould be as broad as long. Vitruvius calls the landing-places of the theatres diazomata.

PALLIFICATION, in architecture, the piling of the ground-work, or ſtrengthening the ground with piles drove in, when it is moiſt or marſhy.

PALLIUM, or PALL, a pontifical ornament worn by popes, patriarchs, primates, and metropolitans of the Romiſh church over their other garments, as a ſign of their juriſdiction. It is a fillet three fingers broad, encompaſſing the ſhoulder with pendants a palm long before and behind, with little laminæ of lead rounded at the extremes, and covered with black ſilk, and with four red croſſes. It is made of white lambs wool, &c.

The pope pretends to the ſole right of conferring the pallium, before receiving which, a metropolitan cannot conſecrate biſhops or churches, nor perform any archiepiſcopal function. The uſe of the pallium is reſtrained to particular occaſions; and none but the pope has the right of wearing it always, and in all places.

PALM, *Palmus*, an ancient meaſure of length, taken from the extent of the hand.

The Roman palm was of two kinds; the great palm anſwered to our ſpan, and contained 12 fingers breadth, or nine Roman inches equal to about $8\frac{1}{2}$ inches Engliſh: the ſmall palm contained four fingers equal to about two Engliſh inches $\frac{9}{10}$.

The Greek palm or doron was of two kinds; the ſmall contained four fingers equal to two inches $\frac{2}{7}$. The great contained nine fingers. The double Greek palm, or dichas, contained in proportion.

The modern palm is different in different places. At Rome, it contains ſeven inches $\frac{5}{10}$; at Naples, eight inches; at Genoa, eight inches $\frac{8}{10}$; at Morocco and Fez, ſeven inches $\frac{2}{10}$; in Languedoc and ſome other parts of France, eight inches $\frac{1}{7}$; and, in England, it is three inches. At Leghorn, there is a palm for woollens, and another for ſilks, the latter one third longer than the former.

PALM, *Palma*, *Vola*, *Metacarpion*, in anatomy, the inſide of the hand. See HAND.

PALM-*Sunday*, the Sunday preceding Eaſter-day; ſo called in memory of our Saviour's riding in triumph into Jeruſalem, when the multitude attending him ſtrewed palm-branches in the way.

PALMARIS MUSCULUS, one of the flexor muſcles of the hand, ſo called as being inſerted into the palm of the hand by a broad expanded tendon: its office ſeems to be to contract the palm of the hand. There is alſo another muſcle of the hand called palmaris brevis, and quadratus, in form of a ſmall maſs of fleſh, which adheres to the aponeuroſis of the former muſcle, above the abductor muſcle of the little finger; it is ſaid to aſſiſt in drawing together the hand; but Heiſter obſerves, that both theſe muſcles are found wanting in diſſections.

PALPABLE, ſomething perceivable by the ſenſes, particularly that of feeling.

PALPEBRÆ, the eye-lids, in anatomy. See EYE.

PALPITATION, in medicine, a ſpaſtick contraction of the heart, when it leaps and beats violently.

PALSY, παράλυσις, in medicine, a diſeaſe wherein the body, or ſome of its members, loſe their motion, and ſometimes their ſenſation of feeling. This diſeaſe never is acute, is often tedious, and in old people, almoſt incurable; and the patient for the moſt part drags a miſerable life. For the vigour of his mind, together with his memory, are loſt, or vaſtly impaired; he totters and ſhakes, and becomes a diſmal ſight; as if no longer a man, but an animal half dead.

PALUMBES, the ring-dove, a beautiful ſpecies of pigeon, with the neck white on each ſide, and a brown ſpot behind.

PALY, or PALE, in heraldry, is when the ſhield is divided into four or more equal parts, by perpendicular lines falling from the top to the bottom.

Paly-

Paly-bendy is when the efcutcheon is divided by perpendicular lines, which is paly; and alfo by diagonals, which is called bendy.

PAMPINIFORME Corpus, in anatomy, a plexus, or knot, formed by the fpermatick veins and arteries, and included in a common coat, within the tefticle. See Testicle.

PANACEA, among phyficians, denotes an univerfal medicine, or a remedy for all difeafes; a thing impoffible to be obtained, according to no lefs an author than Boerhaave.

PANADA, a diet confifting of bread boiled in water to the confiftence of a pulp, and fweetened with a little fugar. It is given to young children, and to fick perfons, whofe digeftion is weak, or where ftronger foods would be improper. It is fometimes made thin, to ferve as a drink.

PANATHENÆA, in Grecian antiquity, an ancient Athenian feftival, in honour of Minerva, who was the protectrefs of Athens, and called Athena.

PANCHYMAGOGUE, in pharmacy, a name given to fome cathartick extracts, that have the reputation of purging off all kinds of humours.

PANCRATIUM, among the ancients, a kind of exercife, which confifted of wreftling and boxing. In thefe contefts it was cuftomary for the weaker party, when he found himfelf preffed by his adverfary, to fall down, and fight rolling on the ground.

Pancratium, in botany, a genus of the hexandria monogynia clafs. It has fix petals, and a nectarium divided into 12 fegments, and the ftamina lie upon the nectarium. There are feven fpecies, none of them natives of Britain.

PANCREAS, in anatomy, is a long flat gland, of that kind which anatomifts call conglomerate, fituated under the ftomach between the liver and fpleen; its figure refembles that of a dog's tongue, and is divided into two fides, one fuperior, the other inferior; two edges, one anterior, the other pofterior; and two extremities, one large which reprefents the bafis of a tongue, and one fmall and a little rounded like the point of a tongue.

The pancreas is fituated tranfverfely under the ftomach in the duplicature of the pofterior portion of the mefocolon. The large extremity is connected to the firft incurvation of the duodenum, and from thence it paffes before the reft of that inteftine, all the way to its laft incurvation; fo that a great part of the duodenum lies between the pancreas and the vertebræ of the back. The fmall extremity is fixed to the omentum, near the fpleen.

The pancreas is compofed of a great number of foft glandular molecules, combined in fuch a manner as to exhibit the appearance of one uniform mafs on the outfide, the convexities more or lefs flatted. When thefe molecules are feparated a little from each other, we find, along the middle of the breadth of the pancreas, a particular duct in which feveral fmaller ducts terminate laterally, on each fide, like fmall branches in a ftem.

The ufe of the pancreas is to fecrete a peculiar liquor called the pancreatick juice, which is of a falivofe nature, and carried by the pancreatick duct into the duodenum, where it ferves to dilute the chyle, to render it more fluid, and fit it to enter the mouths of the lacteals; and, perhaps, to temper and dilute the bile, to change its vifcidity, bitternefs, colour, &c. and make it mix with the chyle, in order to reduce the feveral taftes, odours, and properties of the feveral foods, into one homogeneous one.

PANDECTS, in the civil law, collections made by Juftinian's order, of 534 decifions of the ancient lawyers, on fo many queftions occurring in the civil law; to which that emperor gave the force and authority of law, by an epiftle prefixed to them. The pandects confifted of 50 books, and make the firft part of the body of the civil law.

PANEGYRICK, an oration in praife of fome extraordinary thing, perfon, or virtue.

Panegyricks were anciently made in the publick and folemn affemblies of the Greeks, either at their games, their feafts, or religious meetings. To render them the more folemn, they ufed to begin with the praifes of the deity, in whofe honour the games, &c. were celebrated; then they defcended to the praifes of the people or country where they were celebrated; then to the princes or magiftrates who prefided at them; and at length to the champions, efpecially thofe who had gained the prize.

Panegyrick is ranked among the demonftrative kinds of orations, whereof there are commonly reckoned two kinds, viz. the artificial, where every thing is reduced to certain heads; and the other natural, where the order of hiftory is obferved.

PANEL, in law, fignifies a fchedule, or fmall roll of parchment, in which is contained the names of the jurors returned by the fheriff, to pafs upon trial; fo that the impanelling of a jury is no more than the fheriff's entering them upon his panel or roll.

PANICK, denotes an ill-grounded terror or fright.

PANICUM, panick, in botany, a genus of plants, the flower of which is compofed of two fharp pointed valves, and inclofes the feed, which is fingle and roundifh, but fomewhat flatted.

Panick feed is accounted drying, refrigerant, and aftringent; and therefore recommended in fpitting of blood, and nocturnal pollutions.

PANNAGE, *Panagium*, in law-books, fignifies the food that fwine feed upon in woods, as maft of beech and acorns; or money taken by the king's agiftors, for the privilege of feeding hogs in the king's foreft.

PANNEL, in joinery, is a tympanum, or fquare piece of thin wood, fometimes carved, framed, or grooved in a larger piece, between two upright pieces and two crofs pieces.

Pannel, in mafonry, is one of the faces of a hewn ftone.

Pannels *of a Saddle*, are two cufhions or bolfters, filled with cow's, deer's, or horfe-hair, and placed under the faddle, on each fide, to prevent the bows and bands from galling the horfe.

PANNICULUS Carnosus, in comparative anatomy, a robuft flefhy tunick, fituated in beafts, between the tunick and the fat; by means of which they can move their fkin in whole or part: it is altogether wanting in mankind.

PANTHEA, in antiquity, ftatues compofed of the figures or fymbols of feveral divinities.

PANTHEON, in Roman antiquity, a temple of a circular form, dedicated to all the gods: it was built by Agrippa, fon-in-law to Auguftus; but is now converted into a church, and dedicated to the Virgin and all the martyrs.

PAPAVER, the poppy, in botany. See Poppy.

PAPER, a thin leaf, artificially made of fome vegetable fubftance; that which is to write upon with ink, being chiefly white.

The materials on which mankind, in different ages and countries, have contrived to write their fentiments, have been various, as on ftones, bricks, the leaves of flowers and trees, the rinds or barks; alfo, tables of wood, wax, and ivory; to which may be added plates of lead, linen rolls, &c. At length the Egyptian papyrus was invented; then parchment, cotton paper; and, laftly, the common or linen paper.

There are few forts of plants but have been ufed for paper and books; and hence the feveral terms, byblus, codex, liber, folium, tabula, tillura, philyra, fcheda, &c. which exprefs the feveral parts on which they have been written; and though, in Europe, all thefe difappeared upon the introduction of papyrus and parchment; yet ftill the ufe of divers of them obtain to this day in fome other countries. Paper, with regard to the manner of making, and the materials employed therein, is reducible to divers kinds, Egyptian, European, and Chinefe paper; there is alfo mention made of cotton paper, bark paper, and afbeftine or incombuftible paper.

Egyptian Paper, that which was principally ufed among the ancients, made of the rufh papyrus or byblus, growing chiefly about the banks of the Nile. Befides paper, they make fails, ropes, and other naval rigging, as alfo mats, blankets, cloathes, and even fhips, of the ftalks of the papyrus.

Manner of making the Egyptian Paper. They began with lopping off the two extremes of the papyrus, namely, the head and root, as of no ufe in this manufacture; the remaining ftem they flit lengthwife into two equal parts, and from each of thefe they ftripped the thin fcaly pellicles whereof it confifted, with the point of a needle or pen-knife: the innermoft of thofe pellicles were looked on as the beft, and thofe neareft the rind, the worft: they were accordingly kept apart, and conftituted different forts of paper. As the pellicles were taken off,

I they

they extended them on a table; then two, or more of them, were laid over each other tranfverfely, fo as that the fibres made right angles: in this ftate they were glued together by the muddy waters of the Nile, or where the waters of the Nile were not to be had, with a pafte made of the fineft wheat-flour, mixed with hot water, and a fprinkling of vinegar. The pellicles being next preffed to get out the water, then dried, and, laftly, flatted and fmoothed by beating them with a mallet, conftituted paper; which they fometimes polifhed further, by rubbing it with a hemifphere of glafs, or the like.

Bark PAPER, was only the inner whitifh rind inclofed between the bark and the wood of divers trees, as the maple, plane, beech, and elm; but efpecially the tilia, philyra, or linden-tree, which was that moftly ufed for this purpofe. On this, ftripped off, flated, and dried, the ancients wrote books, feveral of which are ftill extant.

Cotton PAPER, *Charta Bombycina*, fo called from βόμβυξ, which anciently fignified filk; though afterwards it came to fignify cotton, is a fort of paper which has been in ufe upwards of 600 years. What is more, cotton paper appears to have been very common at that time, and, confequently, muft have been invented long before. In the French king's library are manufcripts on this paper, which appear to be of the 10th century. Be this as it will, from the 12th century, cotton manufcripts are more frequent than parchment ones.

Linen or *European* PAPER, is chiefly made of linen or hempen rags, beaten to a pulp with large hammers, &c.

When or by whom linen paper was invented is not known, as Polydore Virgil confeffes. Scaliger afcribes the invention to the Germans, Maffei to the Italians; others to fome refugee Greeks at Bafil, who took the hint from the manner of making cotton paper in their own country; and Conringius thinks we received it from the Arabs. Be this as it will, linen paper appears to have been firft introduced among us towards the beginning of the 14th century, which agrees with the obfervations of Count Maffei, who found no marks of its ufe before the year 1300. Some indeed go much further back, and take the libri lintei, mentioned by Livy, and other Roman writers, to have been written on linen paper; but this notion has been fufficiently refuted. Others make the invention more modern than it really is, dating its origin about 300 years ago; but Mabillon fhews the contrary, from many manufcripts about 400 years old, written on linen paper; and Balbinus produces divers inftances of fuch manufcripts written before the year 1340. Add to this, that, in the Cotton library, there are writings on paper, in the times of moft of our kings and queens, as high as the year 1335; and Dr. Prideaux affures us, he has feen a regiftration of fome acts of John Crandon, Prior of Ely, made on paper, which bears date in the 14th year of King Edward the fecond, that is, A. D. 1320. The invention, according to that learned Doctor, feems to have been brought from the Eaft, moft of the old manufcripts in the Arabick and Oriental languages being written on this fort of paper, fome of which are certainly much older than any of the dates above-mentioned. This author thinks it moft probable, that the Saracens of Spain firft brought it out of the Eaft into that country, from whence it was propagated through the reft of Europe. As to the time of its being introduced in England, we read of a paper-mill erected at Dartford, as early as the year 1588, which was probably the firft, and is celebrated by Thomas Churchyard, a noted poet of that age, in a work in verfe, intitled, A defcription and difcourfe of paper, and the benefit it brings; with the fetting forth of the paper-mill, built near Dartford by a high German, called M. Spillman, jeweller to the queen; London, 1588, 4to.

This manufacture is not now peculiar to the Dutch, having got footing in moft parts of Europe; but France, Holland, and Genoa are places where it has beft fucceeded. The Englifh manufacture is daily growing into reputation, and we now almoft rival the Dutch in making paper, fo that we import much lefs from Holland than formerly; and there is great hopes, from the improvement lately made in this bufinefs, that we fhall foon make as good paper at home, as any part of Europe can produce.

Method of making linen PAPER. The linen rags, being carried to the mill, are firft forted, then wafhed very clean in puncheons, whofe fides are grated with ftrong wires, and the bottomes bored full of holes. After this they are fermented, that is, laid in fquare heaps, clofe covered with facking till they fweat and rot, which is commonly done in four or five days. When duly fermented, they are twifted into handfuls, cut fmall, and thrown into oval mortars, made of well-feafoned oak, about half a yard deep, with an iron plate at bottom an inch thick, 8 inches broad, and 30 long. In the middle is a wafhing-block, with 5 holes in it, and a piece of hair-fieve faftened on the infide, fo that nothing can pafs out except dirty water. Thefe mortars are continully fupplied with water by little troughs, from a ciftern filled by buckets faftened to the floats of the great wheel, which raifes the wooden hammers for pounding the rags in the mortars. When the rags are beaten to a certain degree, called the firft ftuff, the pulp is removed into boxes, made like corn-chandler's bins, with the bottom board aflant, and a little feparation on the front, for the water to drain away. The pulp of the rags being in, they take away as many of the front boards as are needful, and prefs the mafs hard down with their hands: the next day they put on another board, and add more pulp till the box is full; and here it remains mellowing a week, more or lefs, according to the weather. After this, the ftuff is again put into clean mortars, and is beaten a-frefh, and removed into boxes, as before; in which ftate it is called the fecond ftuff. The mafs is beat a third time, till fome of it being mixed with fair water, and brewed to and fro, appears like flour and water, without any lumps in it; it is then fit for the pit-mortar, where it is perfectly diffolved, and is then carried to the vat, to be formed into fheets of paper.

But lately, inftead of pounding the rags to a pulp with large hammers, as above, they make ufe of an engine, which performs the work in much lefs time. This engine confifts of a round folid piece of wood, into which are faftened feveral long pieces of fteel, ground very fharp. This is placed in a large trough with the rags, and a fufficient quantity of water. At the bottom of the trough is a plate with fteel bars, ground fharp like the former; and the engine being carried round with prodigious velocity, reduces the rags to a pulp in a very fhort time. It muft be obferved, that the motion of the engine caufes the water in the trough to circulate, and by that means returns the ftuff to the engine. The trough is conftantly fed with clean water at one end, while the dirty water from the rags is carried off at the other, through a hole, defended with wire gratings, in order to hinder the pulp from going off with the dirty water.

When the ftuff is fufficiently prepared as above, it is carried to the vat and mixed with a proper quantity of water, which they call priming the vat. The vat is rightly primed, when the liquor has fuch a proportion of the pulp, as that the mould, on being dipped into it, will juft take up enough to make a fheet of paper of the thicknefs required. The mould is a kind of fieve, exactly of the fize of the paper to be made, and about an inch deep, the bottom being formed of fine brafs wire, guarded underneath with fticks to prevent its bagging down, and to keep it horizontal; and further, to ftrengthen the bottom, there are large wires placed in parallel lines, at equal diftances, which form thofe lines vifible in all white paper, when held up to the light; the mark of the paper is alfo made in this bottom, by interweaving a large wire in any particular form. This mould the maker dips into the liquor, and gives it a fhake as he takes it out, to clear the water from the pulp. He then flides it along a groove to the cocher, who turns out the fheet upon a felt, laid on a plank, and lays another felt on it, and returns the mould to the maker, who, by this time, has prepared a fecond fheet, in another mould: and thus they proceed, laying alternately a fheet and a felt, till they have made fix quires of paper, which is called a poft; and this they do with fuch fwiftnefs, that, in many forts of paper, two men make twenty pofts, or more, in a day. A poft of paper being made, either the maker or coucher whiftles; on which four or five men advance, one of whom draws it under the prefs, and the reft prefs it with great force, till all the water is fqueezed from it; after which it is feparated, fheet by fheet, from the felts, and laid regularly one fheet upon another; and having undergone a fecond preffing, it is hung up to dry

and Venus when in perigee, are at so great distances from the earth, that their parallax is too small to be observed. When Mars is in opposition to the sun, his distance from the earth is but half so much as the sun's distance from the earth; and, consequently, his parallax is then double to that of the sun: Tycho, in the year 1582, endeavoured, with incredible diligence, to discover the parallax of Mars in opposition; but Kepler, having examined Tycho's observations, concluded from them, that Mars's parallax was scarcely sensible.

Annual PARALLAX of a phænomenon, is the change of its apparent place in the sphere of the heaven, which is caused by its being viewed from the earth in different parts of her orbit: the annual parallax of all the planets is considerable, but that of the fixed stars is insensible. See ABERRATION.

PARALLAX, in levelling, denotes the angle contained between the line of true level and that of apparent level.

PARALLEL, in geometry, is applied to lines, figures, bodies, every where equidistant from each other, and which, though infinitely produced, would never meet; thus, the line O P *(plate* LXIII. *fig.* 3.) is parallel to Q R.

Parallel lines stand opposed to lines converging and diverging. Geometricians demonstrate, that if two parallels, O P and Q R, be cut by a transverse line S T in A and B; 1st. the alternate angles x and y are equal; 2dly. the external angle u is equal to the internal opposite one y; and, 3dly, the two internal opposite ones x and y are also equal to two right angles. It is shewn on the principles of opticks, that if the eye be placed between two parallel lines, they will appear to converge towards a point opposite to the eye. And if they run to such a length, as that the distance between them be put as a point thereto, they will there appear to coincide.

Parallel lines are described by letting fall equal perpendiculars, and drawing lines through the extremes.

PARALLEL *Planes*, are such planes as have all the perpendiculars drawn betwixt them equal to each other.

PARALLEL *Rays*, in opticks, are those which keep at an equal distance from the visible object to the eye, which is supposed to be infinitely remote from the object.

PARALLEL *Ruler*, or *Parallelism*, an instrument consisting of two wooden, brass, &c. rulers A B, C D (*fig.* 4.) equally broad every where, and so joined together by the cross blades E F and G H, as to open to different intervals, accede and recede, and yet still retain their parallelism.

The use of this instrument is obvious; for one of the rulers being applied to R S, and the other withdrawn to a given point V, a right-angle A B, drawn by its edge through V, is a parallel to R S.

PARALLELS, or PARALLEL *Circles*, in geography, called also parallels or circles of latitude, are lesser circles of the sphere conceived to be drawn from west to east through all the points of the meridian, commencing from the equator to which they are parallel, and terminating with the poles. They are called parallels of latitude, because all places lying under the same parellel, have the same latitude.

PARALLELS *of Latitude*, in astronomy, are lesser circles of the sphere parallel to the ecliptick, imagined to pass through every degree and minute of the colours.

They are represented on the globe by the divisions on the quadrant of altitude, in its motion round the globe, when screwed over the pole of the ecliptick. See GLOBE.

PARALLELS *of Altitude* or *Almacantars*, are circles parallel to the horizon, imagined to pass through every degree and minute of the meridian between the horizon and zenith, having their poles in the zenith.

They are represented on the globe by the divisions on the quadrant of altitude, in its motion about the body of the globe, when screwed to the zenith.

PARALLELS *of Declination*, in astronomy, are the same with parallels of latitude in geography.

PARELLEL *Sphere*, that situation of the sphere, wherein the equator coincides with the horizon, and the poles with the zenith and nadir.

In this sphere all the parallels of the equator become parallels of the horizon, consequently, no stars ever rise or set, but all turn round in circles parallel to the horizon; and the sun, when in the equinoctial, wheels round the horizon the whole day. After his rising to the elevated pole, he never sets for six months; and after his entering again on the other side of the line, never rises for six months longer. This is the position of the sphere to such as live under the poles, and to whom the sun is never above 23° 30′ high.

PARALLEL *Sailing*, in navigation, is the sailing under a parallel of latitude. See *Parallel* SAILING.

PARALLELEPIPED, or PARALLELOPIPED, in geometry, a regular solid comprehended under six parallelograms, the opposite ones whereof are similar, parallel, and equal.

All parallelepipeds, prisms, cylinders, &c. whose bases and heights are equal, are themselves equal. A diagonal plane divides a parallelepiped into two equal prisms; so that a triangular prism is half a parallelepiped upon the same base, and of the same altitude. All parallelepipeds, prisms, cylinders, &c. are in a ratio compounded of their bases and altitudes; wherefore, if their bases be equal, they are in proportion to their altitudes; and conversely. All parallelepipeds, prisms, cylinders, cones, &c. are in a triplicate ratio of their homologous sides, and also of their altitudes. Equal parellelepipeds, prisms, cones, cylinders, &c. reciprocate their bases and altitudes. To measure the surface and solidity of a parallelepiped: Find the areas of the parallelograms I L M K, L M O N, and O M K P *(plate* LXIII. *fig.* 5.) add these into one sum, and multiply that sum by 2, the factum will be the surface of the parallelepiped.

If then the base I L M K be multiplied by the altitude M O, the product will be the solidity.

PARALLELISM, the situation or quality whereby any thing is denominated parallel.

PARALLELISM *of the Earth's Axis*, in astronomy, that situation of the earth's axis, in its progress through its orbit, whereby it is still directed towards the pole-star; so that if a line be drawn parallel to its axis, while in any one position, the axis, in all other positions, will be always parallel to the same line. This parallelism is the result of the earth's double motion, viz. round the sun, and round its own axis; or its annual and diurnal motion; and to it we owe the vicissitudes of seasons, and the inequality of day and night. See EARTH.

PARALLELOGRAM, in geometry, a quadrilateral right-lined figure, whose opposite sides are parallel and equal to each other. It is generated by the equable motion of a right line always parallel to itself. When it has all its four angles right, and only its opposite sides equal, it is called a rectangle or oblong. When the angles are all right, and the sides equal, it is called a square. If all the sides are equal, and the angles unequal, it is called a rhombus or lozenge: and if the sides and angles be unequal, it is called a rhomboides.

PARALOGISM, in logick, a false reasoning, or a fault committed in demonstration, when a consequence is drawn from principles that are false; or, though true, are not proved; or when a proposition is passed over that should have been proved by the way.

A paralogism differs from a sophism in this, that the sophism is committed out of design and subtlety, and the paralogism out of mistake and for want of sufficient light and application. See SOPHISM and DEMONSTRATION.

PARALYSIS, the palsy. See PALSY.

PARALYTICK, a person afflicted with the palsy. See PALSY.

PARAMETER, in conick section, a constant line, otherwise called latus rectum. See ELLIPSIS, HYPERBOLA, and PARABOLA.

The parameter is said to be constant, because in the parabola the rectangle under it and any absciss is always equal to the square of the corresponding semi-ordinate; and in the ellipsis and hyperbola, it is a third proportional to the conjugate and transverse axis.

PARAMOUNT, in law, signifies the supreme lord of the fee. See FEE.

PARAPET, in fortification, an elevation of earth designed for covering the soldiers from the enemies cannon or small shot. The thickness of the parapet is from 18 to 20 feet; its height is six feet on the inside, and four or five feet on the outside. It is raised on the rampart, and has a slope above called the superior talus, and sometimes the glacis of the parapet.

PARAPET, is also a little wall raised breast high on the banks

banks of bridges, keys, or high buildings, to ferve as a ftay, and to prevent people falling over.

PARAPHERNALIA, or PARAPHERNA, in the civil law, thofe goods which a wife brings her hufband befides her dower, and which are ftill to remain at her difpofal exclufive of her hufband, unlefs there are fome provifion made to the contrary in the marriage contract.

PARAPHIMOSIS, in medicine, a diforder of the penis, wherein the prepuce is fhrunk, and withdrawn behind the glands, fo as not to be capable of being brought to cover the fame; which generally happens in venereal diforders.

PARAPHRASE, an explanation of fome text in more ample terms.

Chaldee PARAPHRASE. There are three on the pentateuch; that of Onkelos, the paraphrafe of Jonathan, and the targum of Jerufalem. The Chaldee paraphrafe on the prophets is of Jonathan fon of Uzziel; and the author of the Chaldee paraphrafe on the hagiographers is unknown.

PARAPHRENESIS, *Paraphrenitis*, in medicine, an inflammation of the diaphragm, or parts adjacent.

The cure of a paraphrenefis requires the fame cautions, and almoft the fame remedies with that of a pleurify, fuch only excepted, as the fituation of the part affected cannot admit of. Emollient clyfters are often beneficial, in confequence of their acting on the parts next to that affected. But when the diaphragm comes to a fuppuration, and the pus is difcharged, congefted, and putrified in the cavity of the abdomen, a tumour, corrofion of the vifcera, a violent tabes, and at laft death, are produced, fo that this kind of paraphrenefis is incurable.

PARAPLEGIA, *Paraplexia*, in medicine, a fpecies of palfy fucceeding an apoplexy, which fee.

PARASANG, an ancient Perfian meafure, being ufually 30, fometimes 40, and fometimes 50 ftadia or furlongs.

PARASCENIUM, *Pofcenium*, in antiquity, a place behind the theatre whither the actors retired to undrefs, &c.

PARASELENE, mock-moon, in phyfiology, a meteor round the moon, in form of a luminous ring, in which is obferved one, fometimes two, apparent images of the moon. This phænomenon is formed after the fame manner as the parhelia or mock-funs. See the article PARHELIUM.

PARASITE, among the Greeks, originally denoted a very reputable title, being a kind of priefts, in the fame manner as the epulones at Rome. They took care of the facred corn; but of late it has been made a term of reproach, and ufed for a flatterer and mean dependant.

PARASITES, or PARASITICAL PLANTS, in botany, fuch plants as are produced out of the trunk or branches of other plants, from whence they receive their nourifhment, and will not grow upon the ground, as the mifleto, &c.

PARASTATA, in the ancient architecture, a kind of pier for the fupport of a column or arch.

PARASTATÆ, *Epididymis*, *Epididymidæ*, in anatomy, denotes the varicofe paraftatæ, in contradiftinction from the glandulous paraftatæ, now called proftatæ. They are two tuberous bodies lying upon and adhering to the upper part of the teftes; they confift of a convolution of feminal tubuli, mixed with blood veffels.

PARASYNANCHE, in phyfick, a kind of fquinancy, wherein the exterior mufcles of the throat are inflamed and tumefied. See QUINZY.

PARATHESIS. See PARENTHESIS.

PARATHESIS, in grammar, a figure whereby two or more fubftantives are put in the fame cafe.

PARATITLES, *Paratitla*, in jurifprudence, fhort notes or fummaries of the titles of the digefts and code, in order to examine the connection of the feveral parts with one another.

PARAVAIL, in law, the immediate tenant of any fee or land, as being prefumed to have profit therefrom.

PARCÆ, in the Pagan theology, were goddeffes who prefided over the duration of human life; they were the daughters of neceffity and deftiny, and were three in number: Clotho who held the diftaff and drew the thread, Lachefis who twirled the fpindle and fpun it, and Atropos who cut the thread.

PARCEL-MAKERS, two officers in the Exchequer, who make parcels of the efcheator's accounts, charging them with every thing they have levied for the king's ufe, and deliver the fame to one of the auditors to make their accounts therewith.

PARCHMENT, in commerce, fheep and goat's fkins prepared in fuch a manner as to be fit for feveral ufes, as writing and covering of books, &c.

Parchment is begun by the fkinner, and finifhed by the parchment-maker. That called virgin parchment is only a thinner fort than the reft, proper for fans, &c. and made of the fkins of abortive lambs or kids.

Manufacture of PARCHMENT. The fkin having been ftripped of its wool, and placed in the lime-pit, the fkinner ftretches it on a kind of frame, confifting of four pieces of wood, mortifed into each other at the four angles, and perforated lengthways from diftance to diftance, with holes, furnifhed with wooden pins that may be turned at pleafure, like thofe of a violin. See SHAMMY.

To ftretch the fkin on this frame, they make little holes all round it, and through every two holes draw a little fkewer; to this fkewer they tie a piece of fmall packthread, and tie that over the pins; fo that, coming to turn the pins equally, the fkin is ftrained tight every way, like that of a drum. The fkin being thus fufficiently ftretched on the frame, the flefh is pared off with a fharp inftrument for that purpofe; this done, it is moiftened with a rag, and a kind of white ftone or chalk, reduced to a fine duft, ftrewed over it; then with a large pumice-ftone, flat at bottom, much after the manner of a mullet for grinding colours, they rub over the fkin, as if about to grind the chalk, and thus fcower off the remains of the flefh. Then they go over it again with the iron inftrument; again moiften it as before, and again rub it with the pumice-ftone without any chalk underneath; this fmoothens and foftens the flefh fide very confiderably. They drain it again, by paffing it over the iron inftrument as before. The flefh-fide thus drained, they pafs the iron on the wool or hair-fide, then ftretch it tight on the frame by means of the pins, and go over the flefh-fide again with the iron: this finifhes its draining; and the more the fkin is drained, the whiter it becomes. They now throw on more chalk, fweeping it over with a piece of lamb-fkin that has the wool on; this fmoothens it ftill further, and gives it a fine down or nap. It is now left to dry, and, when dried, taken off the frame, by cutting it all round. The fkin, thus far prepared by the fkinner, is taken out of his hands by the parchment-maker, who firft fcrapes or pares it dry on the fummer, with an iron inftrument like that above-mentioned, only finer and fharper; with this, worked with the arm from top to bottom of the fkin, he takes away about one half of its thicknefs. The fkin thus equally pared on both fides, they pafs the pumice-ftone over both fides, to fmoothen it. This laft preparation is performed on a kind of form or bench covered with a fack ftuffed with flocks, and leaves the parchment in a condition for writing on.

The paring the fkin dry on the fummer is the moft difficult preparation in the whole procefs of parchment-making; for which reafon the fkinners feldom dare meddle with it, but ufually leave it to thofe more experienced in it: the fummer whereon it is performed, is a calf-fkin well ftretched on a frame, ferving as a fupport to the fkin, which is faftened a-top of it with a wooden inftrument, that has a notch cut in it. Laftly, that the iron knife may pafs the eafier between the fummer and the fkin to be pared, they put another fkin which they call the counter-fummer. The parings, thus taken off the leather, are ufed in making glue, fize, &c. See GLUE, &c. What we call vellum is only parchment made of the fkins of abortive calves, or at leaft of fucking calves; it is finer, whiter, and fmoother than the common parchment, but it is prepared in the fame manner as that, abating that it is not paffed through the lime-pit.

PARCO FRACTO, in law, a writ againft one who violently breaks open a pound, and takes out beafts that were lawfully impounded.

PARDON, in law, the remiffion of a felony or other offence againft the king or laws. It is twofold; the one ex gratia regis, which the king by virtue of his prerogative, and from fome fpecial regard, grants any perfon; the other per cour de ley, which the king grants, as law and equity perfuade, for fome flight offence, as cafual homicide, &c.

PAREGORICKS, *Paregorica*, in medicine, are ſuch lenient or mitigating remedies as aſſuage pain; the ſame as anodynes or opiates.

PARELCON, in grammar, a figure by which a word or ſyllable is added to the end of another.

PARENCHYMA, in anatomy, a term introduced by Eraſiſtratus, ſignifying all that ſubſtance which is contained in the interſtices betwixt the blood-veſſels of the viſcera, which he imagined to be extravaſated and concreted blood. The moderns having diſcovered all the viſcera to be vaſculary and glandulous, have rejected this term, together with the doctrine.

PARENCHYMA *of Plants*. Grew applies the term parenchyma to the pith or pulp, or that inner part of a fruit or plant through which the juice is ſuppoſed to be diſtributed. This, when viewed with a microſcope, appears to reſemble marrow, or rather a ſponge, being a porous, flexible, dilatable ſubſtance. Its pores are innumerable and exceedingly ſmall, receiving as much humour as is requiſite to fill and extend them, which diſpoſition of pores it is that is ſuppoſed to fit the plant for vegetation and growth.

PARENT, *Parens*, a term of relation applicable to thoſe from whom we immediately receive our being.

PARENTHESIS, in grammar, certain intercalary words, inſerted in a diſcourſe, which interrupt the ſenſe, or thread, but ſeem neceſſary for the better underſtanding of the ſubject.

The proper characteriſtick of a parentheſis is, that it may be either taken in or left out, the ſenſe and the grammar remaining intire. In ſpeaking, the parentheſis is to be pronounced in a different tone; and in writing, it is encloſed between (), called alſo a parentheſis, but commonly a bracket, or crotchet, to diſtinguiſh it from the reſt of the diſcourſe. The politeſt of our modern writers avoid the parentheſis, as keeping the mind in ſuſpenſe, embarraſſing it, and rendering the diſcourſe leſs clear, uniform, and agreeable.

PARERGA, in architecture, ſignifies appendages, or additions made to ſome principal work, by way of ornament.

PARGET, in natural hiſtory, a name given to ſeveral kinds of gypſum, or plaſter-ſtone. See PLASTER.

PARGETING, in building, is uſed for the plaſtering of walls, and ſometimes for the plaſter itſelf.

Pargeting is of various kinds, as, 1. white-lime, hair, and mortar, laid upon bare walls: 2. on bare laths, as in partitioning and ceiling: 3. rendering the inſides of walls, or doubling partition walls: 4. rough-caſting upon heart-laths: 5. plaſtering upon brick-work, with a finiſhing mortar in imitation of ſtone-work.

PARHELIUM, or PARHELION, in phyſiology, a mock ſun or meteor in form of a very bright light appearing on one ſide of the ſun. The parhelia are formed by the reflection of the ſun's beams on a cloud properly poſited. They uſually accompany the coronæ, or luminous circles, and are placed in the ſame circumference and at the ſame height. Their colours reſemble that of the rainbow, the red and yellow are on the ſide towards the ſun, and the blue and violet on the other. There are coronæ ſometimes ſeen without parhelia, and vice verſa.

PARIETALIA OSSA, in anatomy, the ſecond and third bones of the cranium; being called alſo oſſa bregmatis, and oſſa ſincipitis.

PARIETES, in anatomy, a term uſed for the incloſures or membranes, that ſtop up or cloſe the hollow parts of a body, eſpecially thoſe of the heart, thorax, &c.

PARIETARIA, PELLITORY OF THE WALL, in botany, a genus of plants, producing hermaphrodite and female, apetalous flowers; the calyx of each is a monophyllous perianthium: the ſtamina are four ſubulated filaments, topped with twin antheræ; there is no pericarpium, but the ſeed, which is ſingle, and of an oval form, is contained in the cup. Pellitory flowers in May, and grows upon old walls and buildings in ſeveral parts of England.

This plant is very famous in the materia medica as cooling and abſtergent. It is preſcribed in ſtranguries, and in caſes of gravel, or ſmall ſtones in the kidnies, and is an ingredient in decoctions for clyſters to be given in nephritick caſes. Externally, it is much recommended in the eryſipelas, and for the ſoftening of hard tumours.

PARIS, herb true-love, in botany, a plant producing cruciform flowers: the fruit is a globoſe berry, containing four cells, which are filled with ſeeds arranged in a double ſeries. This plant grows wild in moiſt ſhady woods in many parts of England.

PARISH, a circuit of ground inhabited by people who belong to one church. The diviſion of England into pariſhes, is attributed to Honorius, Archbiſhop of Canterbury, in 636. Camden reckons 9284 pariſhes in England. Chamberlayn makes, at preſent, 9913; of which 3845 are churches impropriate, and the reſt are annexed to colleges, or church dignities.

PARK, a large incloſure privileged for wild beaſts of chace, either by preſcription or the king's grant. No perſon can now erect a park without his obtaining firſt a licence under the broad-ſeal; but there may be ſuch in reputation, though erected without lawful warrant, and the owner may bring his action againſt perſons that kill his deer therein. The pulling down walls, or pales, makes the offenders liable to the ſame penalty as for killing of deer.

PARK, is alſo uſed for a moveable incloſure, or fold, ſet up in the fields for ſheep to feed and reſt in during the night. This park is frequently removed by the ſhepherds to dung the ground one part after another.

PARK, alſo ſignifies a large net, placed on the brink of the ſea, with only one entrance, which is next to the ſhore, and which is left dry by the ebb of the tide, ſo that the fiſh once got in, have no way left to eſcape.

PARLEY, a conference with an enemy. Hence to beat or ſound a parley, is to give a ſignal for holding ſuch a conference by beat of drum or ſound of trumpet.

PARLIAMENT, the aſſembly of the king and three eſtates of the realm; viz. the lords ſpiritual, the lords temporal, and commons; which aſſembly or court is, of all others, the higheſt, and of greateſt authority.

PARLOUR, *Parloir*, a little room in nunneries and convents for talking; but commonly it denotes a fair lower room, deſigned principally for the entertainment of company.

PARMA, among antiquaries, a kind of ancient buckler, which Virgil mentions as a light piece of armour, in compariſon with the clypeus, though bigger than the pelta.

PARMULARES, in antiquity, a kind of gladiators who fought armed with the parma.

PAROCHIAL, any thing belonging to a pariſh.

Every church is either *cathedral*, or a biſhop's ſee; *collegiate*, conſiſting of ſome religious order, or of a dean and chapter; and *parochial*, inſtituted for the performing of divine ſervice, to perſons within a certain diſtrict.

PARODICAL *Degrees of an Equation*, in algebra, are the ſeveral regular terms in quadratick, cubick, biquadrick equations, &c. the indexes of whoſe powers aſcend or deſcend orderly in an arithmetical progreſs, as $z^3 + z^2 n + zr = s$, is a cubical equation, where no term is wanting, but having all its parodick degrees, the indexes of the terms regularly deſcending thus, 3, 2, 1, 0.

PARODY, a popular maxim, adage, or proverb.

PARODY is alſo a poetical pleaſantry, conſiſting in applying the verſes written on one ſubject, by way of ridicule to another; or in turning a ſerious work into a burleſque, by affecting to obſerve, as nearly as poſſible, the ſame rhymes, words, and cadences.

PAROIMIA, a proverb, or common ſaying.

PAROLE, or PAROL, in law, a plea in any court.

Leaſe-PAROLE, or *per Parole*, a leaſe by word of mouth, in contradiſtinction from one in writing.

PAROLE, in war, when a priſoner has leave to go any where, upon his promiſe of returning at a time appointed, if not exchanged.

PARONOMASIA, in rhetorick, a figure whereby words, nearly alike in ſound, but of different ſenſes, are deſignedly made uſe of.

PARONYCHIA, a whitloe, in medicine, a painful kind of tumour, ariſing at the ends of the fingers and the roots of the nails. For the eaſier cure of a paronychia, its ſpecies ſhould firſt be conſidered. If it be of the mild or firſt kind, and has not penetrated deep, the cure may, without difficulty, be obtained. As ſoon as the purulent matter becomes prominent, like a tubercle or bliſter, let the ſurgeon place a finger on each ſide of the affected part; and ſtretching the ſkin, by drawing it on both ſides, from the whitloe, make the inciſion: thus will the matter be diſcharged, and the finger will generally heal ſpontaneouſly.

ſpontaneouſly. Hildanus, in cent. 1. obſ. 97. gives the following ſafe and ready method of curing a paronychia, which he had frequently tried with ſucceſs. He firſt fomented the finger ſeveral times, with the decoction of the flowers of the chamomile, and melilot, and fenugreek, and quince-ſeeds. boiled in cows milk; then he gradually cut off the ſurface of the ſkin where the pain was. The ſkin being thus removed, ſome red ſpecks appeared, in which, upon inciſion, he found one or two ſmall drops of a red water; and, this being diſcharged, he applied a linen cloth, moiſtened with a ſolution of Venice treacle in brandy; the pain immediately ceaſed, and next day the finger was ſound.

PAROTIDES, in anatomy, two remarkable glands, ſituated one on each ſide, between the ear and the angle of the lower jaw.

Parotides is alſo the name of certain tumours or inflammations ariſing behind the ears, or the parotid glands.

PAROXISM, in medicine, the ſevere fit of a diſeaſe, under which it grows higher, or exaſperates, as of the gout, &c. It is alſo uſed for the acceſs or return of a diſeaſe, as an ague, &c.

PARRELS, in a ſhip, are frames made of trucks, ribs, and ropes, which having both their ends faſtened to the yards, are ſo contrived, as to go round about the maſt; that the yards, by their means, may go up and down upon the maſts; theſe alſo, with the breaſt ropes, faſten the yards to the maſts.

PARRICIDE, *Parricida*, or *Patricida*, ſtrictly ſignifies the murder or murderer of a father, as matricide does of a mother; yet this word is ordinarily taken in both ſenſes, and is alſo extended to the murder of any near relation, as huſband, wife, brother, ſiſter, child, grand-child, uncle, &c. and even to that of great or ſacred perſons, though no way allied in blood, as a king, &c.

PARROQUET, in ornithology, a ſubdiviſion of parrots.

PARROT, *Pſittacus*, a genus of birds, of the order of the accipitres, the characters of which are theſe; the beak is of a hooked or uncinated figure; and the toes are four on each foot, two forwards and two backwards.

PARRYING, in fencing, the action of warding off the blows aimed at one by another.

PARSLEY, *Apium*, the name of a plant too well known in this country to need any deſcription here. It is cultivated in gardens for culinary uſes, and will endure the cold tolerably well, but is apt to be deſtroyed in very ſevere winters, eſpecially where the ſoil is moiſt. It is generally ſown in ſpring, and the plant appears the following year. The common parſley is, by ſome ſkilful people, cultivated in fields for the uſe of ſheep, it being a ſovereign remedy to preſerve them from the rot, provided they are fed twice a week, for two or three hours each time, with this herb: but hares and rabbets are ſo fond of it, that they will come from a great diſtance to feed on it; ſo that whoever has a mind to have plenty of hares in their fields, by cultivating parſley, will draw all the hares of the country to them.

The leaves of parſley are cooling, and good for cleanſing the viſcera; they alſo abſterge much ſlime and viſcid adheſions from the ſtomach and bowels, cleanſe all the paſſages, keep the juices fluid, and greatly aſſiſt their diſcharge by urine. The root is one of the five opening roots; it is attenuant, aperient, detergent, and diuretick; it is good in decoctions, diet-drinks, and medicinal ales, for cleanſing the blood (as it is commonly called) and draining off ill humours by urine. The ſeed is one of the four hot ſeeds, and is ſaid to be good in the gravel and dropſy.

PARSNEP, *Paſtinaca*, in botany, a genus of umbelliferous plants, the univerſal flower of which is uniform, and the particular ones are each compoſed of five lanceolated incurved petals, with five hairy ſtamina; there is no pericarpium, but the fruit, which is plane, elliptical, and compreſſed, is compoſed of two flattiſh marginated ſeeds.

The roots of this plant are of great uſe as food, for which they are chiefly cultivated, they are more nouriſhing than carrots, though ſome people have a natural averſion to their uſe. The roots and ſeed of wild parſnep are ſometimes uſed in medicine, and are recommended as a remedy againſt agues, and are reckoned good in flatulencies and cholicks.

PARSON, the rector or incumbent of a pariſh-church.

PARSONAGE, a rectory or pariſh-church, endowed with a houſe, glebe, lands, tythes, &c. for the maintenance of a miniſter, with cure of ſouls within ſuch pariſh. There may, notwithſtanding, be a parſonage without either glebe or tythes, but only annual payments inſtead thereof.

PART, *Pars*, a portion of ſome whole, conſidered as divided or diviſible.

Noble or *Eſſential* Parts, in phyſick, thoſe abſolutely neceſſary to life, as the heart, brain, &c.

Natural or *genital* Parts, thoſe miniſtering to generation.

Part, in geometry and aſtronomy, denotes the diviſion of lines and circles. The ſemi-diameter of the circle, called alſo the radius and whole ſine, is generally divided into 100,000 parts, and the circumference of the circle into 360 parts or degrees: in theſe two diviſions all the celeſtial computations are made.

Aliquot Part, a quantity, which, being repeated any number of times, becomes equal to an integer, as 5 of 20, &c.

Aliquant Part, a quantity, which, being repeated any number of times, becomes always greater or leſs than the whole; thus 4 of 15, and 9 of 10, &c. The aliquant part is reſolvible into aliquot parts.

Proportional Part, a part analagous to ſome other part, or a medium to find ſome part unknown by equality of reaſon.

Similar Parts, are thoſe which are to one another, as their wholes are to one another.

Part, in muſick, a piece of the ſcore or partition written by itſelf, for the convenience of the muſician; or the parts are the ſounds made by ſeveral perſons ſinging or playing in concert. There are four principal parts, the treble, baſs, tenor, and counter-tenor.

Muſick in parts was unknown to the ancients; all their harmony conſiſted in the ſucceſſion of notes, and none in the conſonance.

Parts *of Speech*, in grammar, are all the words that enter the compoſition of a diſcourſe, as noun, pronoun, verb, participle, adverb, conjunction, prepoſition, and interjection.

PARTERRE, in gardening, a level diviſion of ground which generally faces the ſouth and beſt front of a houſe, and is furniſhed with greens, flowers, &c. made in various forms.

PARTI, Party, or Parted, in heraldry, denotes a ſhield, or eſcutcheon, divided into partitions.

The French have but one ſimple parti, but with us it is applied to all the ſorts of partitioning, as parti per croſs, per chief, per pale, per feſſe, per bend dexter, per bend ſiniſter, per chevron, &c.

Parti *per Pale*, when the ſhield is divided perpendicularly, by a cut in the middle from top to bottom.

Parti *per Feſſe*, when the cut is acroſs the middle, from ſide to ſide.

Parti *per Bend Dexter*, is when the cut comes from the upper corner of the ſhield on the right hand, and deſcends athwart to the oppoſite lower corner.

Parti *per Bend Siniſter*, is when the cut, coming from the upper left corner, deſcends acroſs to the oppoſite lower one.

When the ſhield is parti and coupé, it is ſaid to be ecartelé. It is ſaid to be parti one from the other, when the whole ſhield is charged with ſome honourable bearing, divided by the ſame line that parts the ſhield. Here it is a rule that one ſide be of metal, and the other of colour.

PARTICIPATION, *Participatio*, that which gives us a ſhare in any thing, either by right or grace.

PARTICIPLE, *Participium*, in grammar, an adjective formed of a verb, ſtill participating of ſome of the properties thereof. There are two kinds of participles; the one active, as expreſſing the ſubject which makes the action of the verb, as docens, currens, teaching, running; the other called paſſive, as expreſſing the ſubject that receives the action, as lectus, auditus, read, heard.

As our adjectives in Engliſh are not declined, the participles, being real adjectives, are not declined neither: in the Latin and French, &c. where theſe adjectives are declined, the participles active are ſo too.

PARTICLE, *Particula*, in phyſick, the minute part of

of a body, of ſeveral of which natural bodies are compoſed: the ſame with atom or corpuſcle.

PARTICLE, in grammar, a little indeclineable word, which ſerves to expreſs the circumſtances of ſomething.

Particles may be reduced under three heads; the firſt ſhews the qualities of words by being added thereto, called adverbs; the ſecond denotes ſome circumſtances of action, joining words to words, ſentence to ſentence, &c. called conjunction; and the third expreſſes the emotions of the ſoul, called interjection.

PARTIES, in law, ſignify the perſons that are named in a deed or fine, viz. thoſe that made the deed, or levied the fine, and alſo thoſe to whom the ſame was made or levied.

PARTING, or DEPARTING, a method of ſeparating gold and ſilver, by means of aqua-fortis.

PARTITION, in law, ſignifies a diviſion of lands, &c. deſcended by common law or cuſtom among coheirs or parceners, being two at leaſt. Partition may alſo be made by joint tenants, and tenants in common by aſſent, deed, or writ.

PARTNER, and PARTNERSHIP. See the article FELLOWSHIP.

PARTRIDGE, in ornithology, is a ſpecies of tetrao, with a naked ſcarlet mark behind the eyes. The common partridge is too well known to need a further deſcription; it is common in fields, and called by authors perdix. But beſides the common kind, there is another ſomewhat larger ſpecies, called the red-legged partridge, with a grey tail, variegated in the upper part with brown.

PARTURITION, *Parturitio*, the act of bringing forth young.

PARTY, a faction or power, conſidered as oppoſite to another.

PARTY, in the military ſenſe, a ſmall body of men, whether foot or horſe, or both, ſent out on an expedition.

PARULIS, in medicine, a painful tumour of the gums, with an inflammation and ſwelling of the cheek, more or leſs, which is ſometimes occaſioned by the tooth-ach.

Such tumours are to be treated by digeſtives. If the diſorder be recent, in order to alleviate the pain, let the patient hold a little of the warm decoction of chamomile, ſage, flowers of elder, &c. in his mouth; and, outwardly, apply a bag with the ſame herbs, or a plaiſter of melilot, or diachylon with camphire; or a warm cloth to obtain an eaſy reſolution, not omitting, internally, diaphoretick and reſolvent medicines. If theſe methods fail, recourſe muſt be had to emollients, as marſhmallows, mallows, mullein, figs, &c. As ſoon as the ſoftneſs indicates a ſuppuration, an inciſion muſt be made into the tumour, to prevent a fiſtula, the matter expreſſed with the fingers, and the ulcer often cleanſed with warm wine, a decoction of agrimony, and St. John's wort, mixed with honey of roſes. But if the ulcer ſhould degenerate into a fiſtula, after uſing the above-mentioned injections, a little of the oil of myrrh per deliquium, or elixir proprietatis, ſhould be inſtilled into the ulcer for deterging and healing it. But if none of theſe medicines ſucceed, the fiſtula muſt be laid open by inciſion, and the caries extirpated, either by medicines, the raſp, or the actual cautery. *Heiſter's Surgery.*

PASCHAL, ſomething belonging to the Jewiſh paſſover, or Chriſtian Eaſter.

PASQUIN, a mutilated ſtatue, ſeen at Rome in a corner of the palace of the Urſini, ſo called from a cobler of that name, famous for his ſneers and gibes. After Paſquin's death, upon digging the pavement before his ſhop, they found a ſtatue of an ancient gladiator, which being ſet up at the corner of the deceaſed maſter Paſquin's ſhop, was, by common conſent, called by his name. From that time all ſatires and lampoons are put in this ſtatue's mouth, or paſted againſt it. Paſquin uſually addreſſes himſelf to Marforio, another ſtatue in Rome, or Marforio to Paſquin, and thus they mutually come to each other's aſſiſtance.

PASQUINADE, PASQUIL, properly denotes a lampoon faſtened to the ſtatue of Paſquin, but it has been extended to any ſneer upon the publick, or the ruling powers.

PASS, PASSADE, in fencing, a leap or advance upon the enemy. Some paſſes are voluntary, commencing from the left foot out of meaſure of the firm foot, as when the enemy is not expected: others are neceſſarily made after a puſh from the right foot, where, being ſo preſſed, as not to have time to retire, you endeavour to ſeize the guard of his ſword. The meaſure of the paſs is, when the two ſmalls of the ſwords are ſo near as that they may touch each other. There are paſſes within, above, beneath, to the right, the left, under the ſword, over the line, &c.

PASS *of Arms*, in chivalry, a bridge, road, &c. which the ancient knights undertook to defend, and which was not to be paſſed without fighting the perſon who kept it. He who was diſpoſed to diſpute the paſs, touched one of the armouries of the other knight who held the paſs, that were hung on pales, columns, &c. erected for the purpoſe; and this was a challenge which the other was obliged to accept. The vanquiſhed gave the victor ſuch prize as was agreed on.

PASSAGE, *Right of Paſſage*, in commerce, an impoſition which ſome princes exact in narrow places of their territories, either by land or ſea, on all veſſels, and carriages of all kinds, &c.

Birds of PASSAGE, are ſuch birds as only come at certain ſeaſons, and then diſappear again, paſſing the ſea to ſome other climate; ſuch are the ſtork, ſwallow, nightingale, martin, woodcock, quail, &c. There are alſo fiſhes of paſſage, as herrings, mackarel, &c.

PASSAGE, in the menage, an action wherein the horſe raiſes a hind and a fore leg together; then, ſetting theſe two on the ground, he raiſes the other two; and thus alternately, never gaining above a foot of ground at a time.

PASSAGE, *Paſſo*, in muſick, a portion of an air, conſiſting of ſeveral quavers, demi-quavers, &c. laſting one, two, or at moſt three meaſures.

PASSANT, in heraldry, is applied to an animal, particularly a lion, in a ſhield, appearing to walk leiſurely. In moſt other beaſts this is called tripping.

PASSION, *Paſſio*, denotes the different agitations of the ſoul, according to the different objects which preſent themſelves to the ſenſes.

PASSIONS, with regard to medicine, make one of the ſix non-naturals, of the utmoſt importance, with reſpect to health or diſeaſe.

Dr. Cheyne divides the paſſions into acute and chronical, for the ſame reaſon as diſeaſes are ſo divided. See his Eſſay on Health, &c.

Dr. Morgan ſeems to have excelled all that preceded him in explaining the origin and effects of the paſſions; he obſerves, 1. That all the grateful paſſions raiſe the vital tide, ſtrengthen and quicken the pulſe, diffuſe the natural heat, and take off any antecedent ſtimulus, or preſſure on the abdomen and inferior organs; and, on the contrary, the painful paſſions ſink and depreſs the blood, &c. 2. All the paſſions impreſs their characteriſtick ſenſations, or modifications of pleaſure and pain, eſpecially on the œſophagus, and upper orifice of the ſtomach. 3. That they impreſs the different modifications on the muſcles of the larynx, and thus diſcover themſelves by the different modulation and tone of the voice. And hence he infers, that the nerves of the eighth conjugation, or par vagum, are the principal inſtruments of the paſſions; by means whereof they are variouſly impreſſed, modified, and organized.

PASSIONS, in poetry, the paſſionate ſentiments, geſtures, actions, &c. which the poet gives his perſons.

Though the paſſions be always neceſſary, yet all are not equally neceſſary. Comedy has joy and agreeable ſurprize for its part; tragedy has terror and compaſſion. The proper paſſion of the epopœa is admiration; though the epopœa, as a medium between the two others, takes in both their kinds of paſſions. Admiration, in effect, is conſiſtent with each: we admire with joy the things that ſurprize us agreeably, and, with terror and grief, thoſe that amaze and afflict us.

Beſides the general paſſion, each epopœa has its peculiar paſſion, which ſtill follows the character of the hero.

To make the paſſions have their proper effect, there are two things required, namely, that the audience be prepared to receive them, and that ſeveral incompatible paſſions be not intermixed.

PASSION, in heraldry, or croſs of paſſion, ſo called, as being in the ſhape of that whereon our Saviour ſuffered.

PASSION-FLOWER, *Paſſiflora*, in botany, a genus of plants, the corolla of which conſiſts of five petals, of the

the largenefs and figure of thofe of the cup: the fruit is a berry, fupported on a pedicle.

There are feveral forts of this plant, but that which is the moft commonly cultivated is the *paffiflora foliis palmatis integerrimis*, paffion-flower with hard fharped entire leaves, or the common paffion-flower.

This plant may be propagated either from feeds, layers, or cuttings; they require a good afpected wall; where they may have height for their fhoots to extend, which fhould be properly trained againft it; and in the fpring the plants muft be pruned, when all the fmall weak fhoots fhould be cut off, and the ftrong ones fhortened to about four or five feet long, which will caufe them to put out ftrong fhoots for flowering the following fummer.

PASSIVE, in grammar, a fecond inflexion of verbs, which, from active, become paffive, by affuming, in moft of the modern languages, new auxiliary verbs, as in Englifh, I am, in French, je fuis, and, in the Italian, jo fono, &c. joined to the participle paffive: in the ancient by new terminations, as laudor, laudari, for laudo, laudare.

Neuter PASSIVE, in grammar, a verb that has a paffive conjugation, but a neuter fignification. There are very few of thefe in Latin, more in French, but fewer in Englifh. Grammarians are frequently miftaken here, taking verbs for neuters paffive, which in effect are actives, and only differ, in that they act on themfelves, by adding the pronoun perfonal; and, which, on that footing, fhould rather be neuters active, than neuters paffive.

PASSOVER, *Pafcha*, a folemn feaft celebrated among the Jews on the 14th day of the moon next after the vernal equinox, in commemoration of the deftroying angel's paffing over the houfes of the Ifraelites, when he deftroyed the firft-born in thofe of the Egyptians. There was a fecond paffover held on the 14th of the fecond month after the equinox, in favour of travellers and fick perfons, who could not attend at the firft.

PASS-*Parole*, a command given in the head of an army, and, from thence, paffed from mouth to mouth till it come to the rear.

PASS-PORT, or PASS, a licence or writing obtained from a prince or governour, granting liberty and fafe conduct to pafs through his territories without moleftation.

PASTBOARD, a kind of thick paper formed of feveral fheets of paper pafted together.

PASTE, a compofition of water and flower, boiled to a confiftence; ufed by various artificers, as fadlers, upholfterers, bookbinders, &c.

PASTE, among jewellers, implies an imitation of the different gems, made with a hard fpecies of glafs.

PASTERN *of a Horfe*, in the menage, is the diftance between the joint next the foot, and the coronet of the hoof. This part fhould be fhort, efpecially in middle-fized horfes, becaufe long pafterns are weak, and cannot fo well endure travelling.

PASTERN-JOINT, the joint next a horfe's foot.

PASTIL, or PASTEL, among painters, a kind of pafte made of different colours, ground up with gum-water, in order to make crayons.

PASTIL, in pharmacy, is a dry compofition of fweet-fmelling refins, aromatick woods, &c. fometimes burnt to clear and fcent the air of a chamber.

PASTINACA, the parfnep, in botany. See PARSNEP.

PASTOR, properly fignifies a fhepherd, but is now generally ufed for a parfon or minifter that hath cure of fouls.

PASTORAL, in general, fomething that relates to fhepherds; hence we fay, paftoral life, manners, poetry, &c.

The original of poetry is afcribed to that age which fucceeded the creation of the world: and as the keeping of flocks feems to have been the firft employment of mankind, the moft ancient fort of poetry was, probably, paftoral. It is natural to imagine, that the leifure of thofe ancient fhepherds admitting and inviting fome diverfion, none was fo proper to that folitary and fedentary life as finging; and that in their fongs they took occafion to celebrate their own felicity. From hence a poem was invented, and afterwards improved to a perfect image of that happy time; which, by giving us an efteem for the virtues of a former age, might recommend them to the prefent. And fince the life of fhepherds was attended with more tranquillity than any other rural employment, the poets have chofen to introduce their perfons; and from this particular it has acquired the name of paftoral.

PASTURE, or *Pafture Land*, a general name for all forts of land referved for the purpofes of feeding cattle.

Pafture ground is of two forts: the one is low meadow land, which is often overflowed; and the other is upland, which lies high and dry. The firft of thofe will produce a much greater quantity of hay than the latter, and will not require manuring or dreffing fo often: but then the hay produced on the upland is much preferable to the other; as is alfo the meat which is fed in the upland more valuable than that which is fatted in rich meadows: though the latter will make the fatter and larger cattle, as is feen by thofe which are brought from the low rich lands in Lincolnfhire. But where people are nice in their meat, they will give a much larger price for fuch as hath been fed on the downs, or in fhort upland pafture, than for the other, which is much larger. Befides this, dry paftures have an advantage over the meadows, that they may be fed all the winter, and are not fo fubject to poach in wet weather; nor will there be fo many bad weeds produced; which are great advantages, and do in a great meafure recompenfe for the fmallnefs of the crop.

The firft improvement of upland pafture is, by fencing it, and dividing it into fmall fields of four, five, fix, eight, or ten acres each, planting timber trees in the hedge-rows, which will fcreen the grafs from the dry pinching winds of March, and will prevent the grafs from growing in large open lands; fo that, if April proves a dry month, the land produces very little hay; whereas in the fheltered fields the grafs will begin to grow early in March, and will cover the ground, and prevent the fun from parching the roots of the grafs, whereby it will keep growing, fo as to afford a tolerable crop, if the fpring fhould prove dry. But, in fencing of land, it muft be obferved, as was before directed, not to make the inclofures too fmall, efpecially where the hedge-rows are planted with trees; becaufe, when the trees are advanced to a confiderable height, they will fpread over the land; and, where they are clofe, will render the grafs four; fo that, inftead of being an advantage, it will greatly injure the pafture.

The next improvement of upland pafture, is to make the turf good, where, either from the badnefs of the foil, or for want of proper care, the grafs hath been deftroyed by rufhes, bufhes, or mole-hills. Where the furface of the land is clayey and cold, it may be improved by paring it off, and burning it in the manner before directed: but, if it is an hot fandy land, then chalk, lime, marle, or clay, are very proper manures to lay upon it: but this fhould be laid in pretty good quantities, otherwife it will be of little fervice to the land.

If the ground is over-run with bufhes or rufhes, it will be a great advantage to the land to grub them up towards the latter part of fummer; and after they are dried, to burn them, and fpread the afhes over the ground juft before the autumnal rains; at which time the furface of the land fhould be levelled, and fown with grafs-feed, which will come up in a fhort time, and make good grafs the following fpring. So, alfo, when the land is full of mole-hills, thefe fhould be pared off, and either burnt for the afhes, or fpread immediately on the ground, when they are pared off, obferving to fow the bare patches with grafs feed, juft as the autumnal rains begin.

Where the land has been thus managed, it will be of great fervice to roll the turf, in the months of February and March, with an heavy wood roller; always obferving to do it in moift weather, that the roll may make an impreffion: this will render the furface level, and make it much eafier to mow the grafs, than when the ground lies in hills; and will alfo caufe the turf to thicken, fo as to have what the people ufually term a good bottom. The grafs, likewife, will be the fweeter for this hufbandry, and it will be a great help to deftroy bad weeds.

Another improvement of upland paftures is, the feeding of them: for, where this is not practifed, the land muft be manured at leaft every third year; and where a farmer hath much arable land in his poffeffion, he will not care to part with his manure to the pafture. Therefore every farmer fhould endeavour to proportion his pafture to his arable land, efpecially where manure is fcarce; otherwife he will foon find his error; for the pafture is the

the foundation of all the profit which may arife from the arable land.

Wherever the upland paftures are mended by manure, there fhould be a regard had to the nature of the foil, and a proper fort of manure applied: as for inftance, all hot fandy land fhould have a cold manure; neat dung and fwine's dung are very proper for fuch lands; but, for cold lands, horfe-dung, afhes, and other warm manures, are proper. And when thefe are applied, it fhould be done in autumn, before the rains have foaked the ground, and rendered it too foft to cart on; and it fhould be carefully fpread, breaking all the clods as fmall as poffible, and then harrowed with bufhes, to let it down to the roots of the grafs. When the manure is laid on at this feafon, the rains in winter will wafh down the falts, fo that the following fpring the grafs will receive the advantage of it.

There fhould alfo be great care had to the deftroying of weeds in the pafture every fpring and autumn: for, where this is not practifed, the weeds will ripen their feeds, which will fpread over the ground, and thereby fill it with fuch a crop of weeds as will foon overbear the grafs, and deftroy it; and it will be very difficult to root them out, after they have gotten fuch poffeffion; efpecially rag-wort, and fuch other weeds as have down adhering to their feeds.

Thefe upland paftures feldom degenerate the grafs which is fown on them, if the land is tolerably good: whereas the low meadows, which are overflowed in winter, in a few years turn to an harfh rufhy grafs, though the upland will continue a fine fweet grafs for many years without renewing.

There is no part of hufbandry, of which the farmers are in general more ignorant than that of the pafture; moft of them fuppofe, that when old pafture is ploughed up, it can never be brought to have a good fward again: fo their common method of managing their land, after ploughing, is, to fow, with their crop of barley, fome grafs feeds, as they call them; that is, either the red clover, which they intend to ftand two years after the corn is taken off the ground, or rye-grafs, mixed with trefoil: but as all thefe are, at moft, but biennial plants, whofe roots decay foon after their feeds are perfected; fo the ground having no crop upon it, is again ploughed for corn: and this is the conftant round which the land are employed in, by the better fort of farmers; for I never have met with one of them who had the leaft notion of laying down their land to grafs for any longer continuance; therefore, the feeds which they ufually fow, are the beft adapted for this purpofe.

But, whatever may have been the practice of thefe people, I hope to prove, that it is poffible to lay down land, which has been in tillage, with grafs, in fuch a manner, as that the fward fhall be as good, if not better than any natural grafs, and of as long duration. But this is never to be expected, in the common method of fowing a crop of corn with the grafs feeds: for wherever this has been practifed, if the corn has fucceeded well, the grafs has been very poor and weak; fo that, if the land has not been very good, the grafs has fcarcely been worth faving: for the following year it has produced but little hay, and the year after the crop is worth little, either to mow or feed. Nor can it be expected to be otherwife; for the ground cannot nourifh two crops: and, if there were no deficiency in the land, yet the corn, being the firft and moft vigorous of growth, will keep the grafs from making any confiderable progrefs; fo that the plants will be extremely weak, and but very thin, many of them which came up in the fpring being deftroyed by the corn; for whenever there are roots of corn, it cannot be expected there fhould be any grafs. Therefore the grafs muft be thin, and, if the land is not in good heart, to fupply the grafs with nourifhment, that the roots may branch out after the corn is gone, there cannot be any confiderable crop of clover: and, as their roots are biennial, many of the ftrongeft plants will perifh foon after they are cut; and the weak plants, which had made but little progrefs before, will be the principal part of the crop for the fucceeding year: which is many times not worth ftanding.

Therefore, when ground is laid down for grafs, there fhould be no crop of any kind fown with the feeds; and the land fhould be well ploughed, and cleaned from weeds; otherwife the weeds will come up the firft, and grow fo ftrong, as to overbear the grafs, and, if they are not pulled up, will entirely fpoil it. The beft feafon to fow the grafs feeds upon dry land is about the middle of September, or fooner, if there is an appearance of rain: for the ground being then warm, if there happen fome good fhowers of rain after the feed is fown, the grafs will foon make its appearance, and get fufficient rooting in the ground before winter; fo will not be in danger of having the roots turned out of the ground by froft, efpecially if the ground is well rolled before the froft comes on, which will prefs it down, and fix the earth clofe to the roots. Where this hath not been practifed, the froft has often loofened the ground fo much, as to let in the air to the roots of the grafs, and done it great damage; and this has been brought as an objection to the autumnal fowing of grafs: but it will be found to have no weight, if the above direction is practifed: nor is there any hazard of fowing the grafs at this feafon, but that of dry weather, after the feeds are fown; for, if the grafs comes up well, and the ground is well rolled in the end of October, or the beginning of November, and repeated again the beginning of March, the fward will be clofely joined at bottom, and a good crop of hay may be expected the fame fummer. But, where the ground cannot be prepared for fowing at that feafon, it may be performed the middle or latter end of March, according to the feafon's being early or late; for, in backward fprings, and in cold land, we have often fowed the grafs in the middle of April with fuccefs: but there is danger, in fowing late, of dry weather, and efpecially if the land is light and dry; for we have feen, many times, the whole furface of the ground removed by ftrong winds at that feafon; fo that the feeds have been driven in heaps to one fide of the field. Therefore, whenever the feeds are fown late in the fpring, it will be proper to roll the ground well foon after the feeds are fown, to fettle the furface, and prevent its being removed.

The forts of feeds which are the beft for this purpofe, are, the beft fort of upland hay-feeds, taken from the cleaneft paftures, where there are no bad weeds: if this feed is fifted to clean it from rubbifh, three bufhels will be fufficient to fow an acre of land. The other fort is the trifolium pratenfe album, which is commonly known by the names of white Dutch clover, or white honeyfuckle grafs: eight pounds of this feed will be enough for one acre of land. The grafs feed fhould be fown firft, and then the Dutch clover-feed may be afterwards fown: but they fhould not be mixed together; becaufe the clover-feeds, being the heavieft, will fall to the bottom, and confequently the ground will be unequally fown.

When the feeds are come up, if the land fhould produce many weeds, thefe fhould be drawn out before they grow fo tall as to overbear the grafs: for where this has been neglected, the weeds have taken fuch poffeffion of the ground, as to keep down the grafs, and ftarve it; and, when thefe weeds have been fuffered to remain until they have fhed their feeds, the land has been fo plentifully ftocked with them, as entirely to deftroy the grafs: therefore it is one of the principal parts of hufbandry, never to fuffer weeds to grow on the land.

If the ground is rolled two or three times, at proper diftances after the grafs is up, it will prefs down the grafs, and caufe it to make a thicker bottom: for, as the Dutch clover will put out roots from every joint of the branches which are near the ground, fo, by preffing down of the ftalks, the roots will mat fo clofely together, as to form a fward fo thick as to cover the whole furface of the ground, and form a green carpet; and will better refift the drought. For, if we do but examine the common paftures in fummer, in moft of which there are patches of this white honeyfuckle grafs growing naturally, we fhall find thefe patches to be the only verdure remaining in the fields. And this, the farmers in general acknowledge, is the fweeteft feed for all forts of cattle; yet never had any notion of propagating it by feeds: nor has this been long practifed in England; for, till within a few years that fome curious perfons imported the feed from Brabant, where it had been long cultivated, there was not any of the feeds faved in England: though now there are feveral perfons who fave the feeds here, which fucceed full as well as any of the foreign feeds which are imported.

As the white clover is an abiding plant, fo it is certainly

tainly

tainly the very beſt ſort to ſow, where paſtures are laid down to remain: for as the hay-ſeeds which are taken from the beſt paſtures, will be compoſed of various ſorts of graſs, ſome of which may be but annual, and others biennial; ſo, when thoſe go off, there will be many and large patches of ground left bare and naked, if there is not a ſufficient quantity of the white clover, to ſpread over and cover the land. Therefore, a good ſward can never be expected, where this is not ſown: for in moſt of the natural paſtures we find this plant makes no ſmall ſhare of the ſward; and it is equally good for wet and dry land, growing naturally upon gravel and clay, in moſt parts of England: which is a plain indication how eaſily this plant may be cultivated, to great advantage, in moſt ſorts of land throughout this kingdom.

Therefore, the true cauſe why the land which has been in tillage, is not brought to a good turf again, in the uſual method of huſbandry, is, from the farmers not diſtinguiſhing which graſſes are annual from thoſe which are perennial: for, if annual or biennial graſſes are ſown, theſe will of courſe ſoon decay: ſo that, unleſs where ſome of their ſeeds may have ripened and fallen, nothing can be expected on the land but what will naturally come up. Therefore this, with the covetous method of laying down the ground with a crop of corn, has occaſioned the general failure of increaſing the paſture in many parts of England, where it is now much more valuable than any arable land.

After the ground has been ſown in the manner before directed, and brought to a good ſward, the way to preſerve it good is, by conſtantly rolling the ground with an heavy roller, every ſpring and autumn, as hath been before directed. This piece of huſbandry is rarely practiſed by farmers: but thoſe who do, find their account in it; for it is of great benefit to the graſs. Another thing ſhould alſo be carefully performed; which is, to cut up docks, dandelion, knapweed, and all ſuch bad weeds, by their roots every ſpring and autumn: this will increaſe the quantity of good graſs, and preſerve the paſtures in beauty. Dreſſing of theſe paſtures every third year is alſo a good piece of huſbandry; for otherwiſe it cannot be expected the ground ſhould continue to produce good crops. Beſides this, it will be neceſſary to change the ſeaſons of mowing, and not to mow the ſame ground every year; but to mow one ſeaſon, and feed the next; for, where the ground is every year mown, it muſt be conſtantly dreſſed, as are moſt of the graſs grounds near London, otherwiſe the ground will be ſoon exhauſted. *Miller's Gard. Dict.*

PATANCE, in heraldry, is a croſs flory at the ends; from which it differs only in this, that the ends, inſtead of turning down like a fleur-de-lis, are extended ſomewhat in the pattee-form.

PATEE, or PATTEE, in heraldry, a croſs ſmall in the centre, and widening to the extremes, which are very broad.

PATELLA, in anatomy, a bone which covers the fore part of the joint of the knee, called alſo rotula, and popularly the knee-pan. The patella is convex on the outſide, and on the inſide unequal, having an eminence and two depreſſions. It is connected by tendons and ligaments to the tibia and the os femoris, which is the ligament by which it is connected to the thigh, and has a motion of aſcent and deſcent in the flexion of the tibia. In infants and children it is cartilaginous.

PATENT, in general, denotes ſomething that ſtands open or expanded: thus a leaf is ſaid to be patent when it ſtands almoſt at right angles with the ſtalk.

PATENTEE, a perſon to whom the king has granted his letters patent.

PATER PATRATUS, in Roman antiquity, the principal perſon among the feciales or college of heralds. See FECIALES.

PATER-NOSTER, the Lord's prayer, ſo called from the two firſt words in Latin. It is alſo ſometimes uſed for a chaplet or ſtring of beads. And, in architecture, the ſame term is uſed for a ſort of ornament cut in the form of beads, either oval or round, uſed on aſtragals, baguettes, &c.

PATH, in general, denotes the courſe or tract marked out to run over, by a body in motion. See MOTION.

PATH *of the Vertex*, a term frequently uſed by Mr. Flamſtead, in his doctrine of the ſphere, for a circle deſcribed by any point of the earth's ſurface, as the earth turns round its axis. The ſemi-diameter of this path is always equal to the ſine of the compliment of the latitude of the point that deſcribes it.

PATHETICK, whatever relates to the paſſions, or that is proper to excite or awake them.

PATHETICK *Nerves*, in anatomy, a pair of very ſmall nerves which ariſe in the brain, and run to the trochlear muſcle of the eye. Theſe nerves have obtained the name pathetick, from their ſerving to move the eyes in the various paſſions.

PATHOGNOMONICK, among phyſicians, an appellation for a ſymptom, or concourſe of ſymptoms, that are inſeparable from a diſtemper, and are found in that only, and no other.

PATHOLOGY, that part of medicine, which explains the nature of diſeaſes, their cauſes and ſymptoms.

PATHOS, a Greek term, literally ſignifying paſſion, is ſometimes uſed for the energy of a diſcourſe, or its power to move the paſſions.

PATIENT, among phyſicians, a perſon under the direction of a phyſician or ſurgeon, in order to be cured of ſome diſeaſe.

PATRICIAN, among the ancient Romans, a title given to the deſcendants of the hundred, or, according to others, of the two hundred firſt ſenators choſen by Romulus, and by him called patres, fathers.

PATRIPASSIANS, *Patripaſſiani*, in church-hiſtory, a Chriſtian ſect, who appeared about the latter end of the ſecond century; ſo called from their aſcribing the paſſion to the Father: for they aſſerted the unity of God in ſuch a manner as to deſtroy all diſtinction of perſons, and to make the Father and Son preciſely the ſame; in which they were followed by the Sabellians, and others. The author and head of the Patripaſſians was Praxeas, a philoſopher of Phrygia in Aſia.

PATROL, in war, a round or march made by the guards, or watch, in the night-time, to obſerve what paſſes in the ſtreets, and to ſecure the peace and tranquillity of a city or camp. The patrol generally conſiſts of a body of five or ſix men, detached from a body on guard, and commanded by a ſerjeant.

PATRON, among the Romans, was an appellation given to a maſter who had freed his ſlave.

PATRON was alſo a name which the people of Rome gave to ſome great man, under whoſe protection they uſually put themſelves.

PATRON in the canon and common law, is a perſon, who having the advowſon of a parſonage, vicarage, or the like ſpiritual promotion, belonging to his manor, hath, on that account, the gift and diſpoſition of the benefice, and may preſent to it whenever it becomes vacant.

PATRONAGE, the right of diſpoſing of a church or benefice, and enjoying ſeveral other privileges, ſuch as having the honourable rights of the church, being interred in the chancel, &c.

PATRONYMICK, among grammarians, is applied to ſuch names of men or women as are derived from thoſe of parents or anceſtors.

PAVEMENT, a layer of ſtone, or other matter, ſerving to cover and ſtrengthen the ground of divers places for the more commodious walking on.

Moſaick PAVEMENT. See MOSAICK-WORK.

PAVIA, the ſcarlet horſe-cheſnut, in botany, a plant which grows naturally in Carolina, and is propagated by ſowing its ſeeds, or by budding, or grafting it upon the common horſe-cheſnut.

PAVICULA, among the Romans, a rammer or inſtrument for beating down or levelling a ſpot of ground, conſiſting of a block of wood, a foot long and half a foot thick, with a long handle.

PAVILION, in architecture, ſignifies a kind of turret or building, uſually inſulated, and contained under a ſingle roof; ſometimes ſquare, and ſometimes in form of a dome: thus called from the reſemblance of its roof to a tent.

Pavilions are ſometimes alſo projecting pieces, in the front of a building, marking the middle thereof; ſometimes the pavilion flanks a corner, in which caſe it is called an angular pavilion. The Louvre is flanked with four pavilions: the pavilions are uſually higher than the reſt of the building. There are pavilions built in gardens, commonly called ſummer-houſes, pleaſure-houſes,

houſes, &c. Some caſtles or forts conſiſt only of a ſingle pavilion.

Pavilion, in military affairs, ſignifies a tent raiſed on poſts, to lodge under in ſummer time. See Tent.

Pavilion, in heraldry, denotes a covering in form of a tent, which inveſts or wraps up the armouries of divers kings and ſovereigns, depending only on God and their ſword.

Pavilions, among jewellers, the underſides and corners of the brilliants, lying between the girdle and the collet.

PAULIONISTS, in church hiſtory, Chriſtian hereticks, of the third century, diſciples of Paul Samoſatenſis, biſhop of Antioch, who denied Chriſt's divinity, maintaining, that when we call him the Son of God, we do not thereby mean that he is really and truly God; but only that he was ſo perfect a man, and ſo ſuperior in virtue to all others, that he has this name given him by way of eminence. The Paulioniſts continued to the fifth century, notwithſtanding the prohibition of the emperor Conſtantine the Great, who forbad them and other hereticks to hold publick aſſemblies.

PAULICIANS, Chriſtian hereticks of the ſeventh century, diſciples of one Conſtantine, a native of Armenia, and a favourer of the errors of Manes; who, as the name Manichees was become odious to all nations, gave thoſe of his ſect the title of Paulicians, on pretence that they followed only the doctrine of St. Paul. One of their moſt deteſtable maxims was, not to give alms to the poor, that they might not contribute to the ſupport of creatures, who were the works of the bad god. See Manichees.

PAUNCH, Pantch, or Panch, on board a ſhip, are broad clouts, woven of thrums and ſinnets together, to ſave things from galling and fretting; therefore they are made faſt to the main and fore-yards for that purpoſe.

PAVO, in aſtronomy, a ſouthern conſtellation, called the peacock.

PAUPER, in law. See Forma Pauperis.

PAUSE, a ſtop or ceſſation of ſpeaking, ſinging, playing, or the like. The uſe of pointing in grammar, is to make proper pauſes in certain places. There is a pauſe in the middle of each verſe; in an hemiſtich it is called a reſt or repoſe.

Pause, in muſick, a character of ſilence or reſt, called alſo by ſome a mute figure; becauſe it ſhews that ſome part or perſon is to be ſilent while the reſt continue the ſong.

PAW, Patte, in heraldry, the fore-foot of a beaſt, cut off ſhort. If the leg be cut off, it is called gambe. Lions-paws are much uſed in armoury.

PEA, in botany. See Pease.

PEACE, a ſtate of tranquillity, and generally uſed in oppoſition to war.

Peace *of the King*, that peace or ſecurity, both of life and goods, which the king promiſes to all his ſubjects, or others under his protection.

PEACH-TREE, a genus of fruit-trees well known, and ſaid to be natives of Perſia.

This tree, in England, grows to a tolerable ſize; is generally trained againſt walls, &c. being too apt to miſcarry of its fruit when planted as a ſtandard; when grown old, it has a pretty thick ſtem, with many brittle branches, and a rediſh and browniſh bark; the leaves are thin, oblong, acuminated, and for the moſt part crenated on their edges, having a bitter taſte; the flowers appear in the beginning of the ſpring before the leaves, and are without pedicles, for they adhere to the tubercles of the branches, and are roſaceous, conſiſting each of five oblong oval petals inſerted in the cup; they are of a light pink colour, and in the middle are many ſtamina; the flower is ſucceeded by a well known globular, furrowed fruit, covered with a thick ſoft whitiſh down. In England there are ſeveral ſorts or varieties cultivated, as, 1. The white nutmeg peach, this is ripe in July. 2. The red nutmeg, this ripens about the beginning of Auguſt. 3. The early purple, this is ripe by the middle of Auguſt. 4. The French mignon; this is a moſt excellent melting peach, and ripens about the middle of Auguſt. 5. The red magdalen; this peach is ripe about the end of Auguſt. 6. The early Newington ripens the end of Auguſt. 7. The nobleſt; this is a fine melting peach, and ripens the end of Auguſt. 8. The chancellor, a good melting peach, and ripens the end of Auguſt. 9. The admirable; this peach parts from the ſtone, and ripens the beginning of September. 10. The old Newington; this peach adheres to the ſtone, and is reckoned one of the beſt ſort. 11. The Portugal peach; this has a rich juice, and adheres to the ſtone; theſe ripen about the middle of September. 12. The nivette, this is a melter, and ripens in September. 13. The pavy of pomponne, is a very large fine peach, and ripens in October. 14. The Catharine; this adheres to the ſtone, is a high flavoured peach, and ripens in October. There are various other ſorts which might be enumerated; but the above-mentioned being of the beſt and richeſt flavour, we think it will ſuffice. The French diſtinguiſh thoſe we call peaches into two ſorts, viz. pavies, and peaches; thoſe are called peaches which ſeparate from the ſtone, and thoſe whoſe fleſh cloſely adheres to the ſtone are called pavies; theſe are much more eſteemed in France than the peaches, though in England the latter are preferred to the former by many perſons.

The beſt expoſitions for peach trees, are the ſouth, ſouth-eaſt, and ſouth-weſt, but they will do tolerably well on a weſt wall, which ripens its fruit juſt as thoſe of the ſouth are gone; they ſhould not be planted in a cold wet ſoil, the fruit in ſuch places are always watery, and inſipid; the beſt ſoil for theſe is freſh untried earth, which is neither too ſtiff nor too moiſt, but of a kind loamy nature; and if the earth in the borders is exhauſted where the trees are intended to be planted, it ſhould be taken away, and its place ſupplied with freſh; all the ſorts of peaches are propagated by inoculation on plumb-ſtocks, and trained in the nurſeries for planting againſt walls, &c. but it is certainly beſt to make choice of ſuch trees, which are of one year's growth from the budding, as they will ſoon overtake in growth thoſe which are called trained trees; the beſt time to tranſplant them is in autumn, when the leaves are turned yellow, when they will have time to form freſh roots, before winter, and thereby be better prepared to ſhoot more vigorous in the ſpring; but the head ſhould not be cut off at that time of planting; but if the ſoil is very moiſt, it is better to plant in the ſpring juſt as the ſap begins to be in motion: in February the tops of the trees ſhould be cut off within four or five eyes of the place of inoculation; and when the weather becomes hot and dry, it may be neceſſary to water the trees: in May the young ſhoots will have made ſome progreſs; thoſe which have a fore-right direction, ſhould be diſplaced, and the others nailed horizontally to the wall; this muſt be repeated as often as it is neceſſary: in October, the branches ſhould be ſhortened in proportion to the ſtrength of the tree, a vigorous branch may be left nine inches or a foot long, but if the ſhoots are weak, half that length is ſufficient; obſerving to train them horizontally, as the middle of the tree will eaſily furniſh itſelf with branches: the ſecond ſummer, they are to be managed as the firſt, diſplacing all fore-right ſhoots as they are produced, and nailing in the others cloſe to the wall horizontally; but the ſhoots ſhould not be ſhortened in the ſummer, unleſs in thoſe places where there happens to be vacancies: in October, ſhorten the ſhoots as before directed, and the following year's management is much the ſame as the preceding. The time for pruning is at the above-mentioned time, where the trees are planted in a dry ſoil; but if the land is moiſt, it is better to defer it till the ſpring.

When peach-trees haſten to bear very ſoon, it is a ſign of decay, or weakneſs, the beſt help for them is to diſburthen the tree of its bloom, pruning it ſhort, and keeping it well watered in hot weather; but when the trees are vigorous, cut out ſuch large branches as appear to be uſeleſs, and nail in the remainder at a good length; and in making choice of ſhoots, always chuſe the middling wood as are full of ſwelling double buds, for thoſe produce fruit, which the flat ſingle ones do not, their product being wood and leaves only; the diſtance theſe trees ſhould be planted, may be about 16 feet: when the fruit is ſet and grown to the bigneſs of a ſmall nut, they ſhould be thinned, leaving them at leaſt five or ſix inches aſunder, for when they are permitted to remain in bunches, as they are often produced, the nouriſhment which ſhould be employed wholly to the fruits deſigned to ſtand, will be equally ſpent amongſt the whole number, a great part of

of which muſt be afterwards pulled off, ſo that the ſooner this is done, the better it will be for the remainder; and if it ſhould ſometimes happen, that a part of thoſe left, by any accident ſhould be deſtroyed, yet the remaining ones will be much the larger, and better flavoured for it, and the trees will gain more ſtrength; for a moderate crop of fruit is always preferable to a great crop; for when the trees are overcharged with fruit, it is always ſmall, ill taſted, and the trees are generally ſo much weakened thereby, as not to be in a condition for bearing well for two or three years after.

PEACOCK, *Pavo*, in ornithology, a genus of birds, of the order of the gallinæ, the characters of which are theſe: there are four toes on each foot, and the head is ornamented with an erect creſt of feathers.

PEAN, in heraldry, is when the field of a coat of arms is ſable, and the powderings or.

PEAR, *Pyrus*, in botany, a genus of fruit-trees, whoſe flower conſiſts of five roundiſh concave petals, which are inſerted in the cup; the fruit is of a pyramidical form, containing five membranaceous cells, each containing a ſmooth, oblong, ovato ſeed, acuminated at the baſe, convex on one ſide and plane on the other.

Pear-trees, it is ſaid, were originally brought from Alexandria, Numidia, Greece, &c. as appears by the names of ſeveral ſorts. The fruit of ſome kinds ripens in the ſummer with us, and others are not fit for uſe until winter or the ſpring.

All the ſpecies of pears are propagated by budding or grafting upon ſtocks of their own kind (commonly called free-ſtocks) or upon quince-ſtocks; the latter are uſed for low walls, dwarfs, or eſpaliers; and eſpecially in wet lands, theſe ſtocks do effectually prevent the too great luxuriancy of the plant, and cauſe it to produce fruit much ſooner than on a pear ſtock; but then, on the other hand, it has this evil attending it, that the tree is but ſhort-lived, and moſt of the ſorts of hard baking pears are rendered ſtony and good for little: on the contrary, moſt melting ſoft pears are greatly improved by being grafted on quince-ſtocks, particularly if the ſoil is of a moiſt ſtrong nature.

The beſt ſeaſons to prune pear-trees is at the fall of the leaf, though it may be deferred till the ſpring, obſerving to cut out all luxuriant branches, which are known by the great diſtance of their buds, and to lay in no more wood than the roots may be reaſonably ſuppoſed capable of ſupplying with ſufficient juices, leaving them at a diſtance from each other, in proportion to the ſize of the fruit; ſuch ſorts whoſe fruit are ſmall may be allowed five or ſix inches, but the larger ones muſt be not leſs than ſeven or eight inches aſunder, always remembering to train the branches horizontally as they are produced, without topping them, by which means there will be little occaſion for much pruning theſe trees; for it appears, that pear-trees have their bearing-buds in three different ſtates, continually ſucceeding each other; the blowing buds of three years old diſcover themſelves at the fall of the leaf, which, whilſt the fruit preceding them was growing and ripening, they were preparing to ſucceed them the enſuing year: theſe buds are produced upon curſons or ſpurs, and are known by their being very full and larger than the others, in a ſeeming ſwelling impatient ſtate of breaking out into its beautiful dreſs of delightful bloom, which is enwrapped within it: the preparative buds of two years are of a ſharp conick figure, and red ruſſet colour, growing very near the fruitful buds before deſcribed: the junior buds of one year are very ſmall, but full above the bark, and always break out near the buds of two years growth; to which may be added, there is a continued ſucceſſion of buds in embryo, ad infinitum.

The diſtance pear-trees ſhould be planted, either againſt walls or eſpaliers, ſhould not be leſs than 30 feet, for if they have not room to ſpread on each ſide, it will be impoſſible to preſerve them in good order, eſpecially thoſe on free-ſtocks, for the more theſe trees are pruned, the more they will ſhoot: many ſorts of pears produce their bloſſom-buds at the extremity of the ſhoots, ſo that when they are ſhortened, the fruit will be cut away, which cannot be avoided where the trees have not room allowed in their firſt planting. The beſt ſeaſon for planting pear-trees in a dry ſoil is at autumn; but if the land be moiſt, the ſpring is to be preferred.

Pears, in general, are windy, and improper for weak ſtomachs; however, thoſe are the beſt that are quite ripe and have a ſweet juice, and then they are ſeldom hurtful, unleſs they are eaten to exceſs.

PEARL, *Margarita*, in natural hiſtory, a hard, white, ſhining body, uſually of a roundiſh figure, found in a teſtaceous fiſh reſembling an oyſter.

It has a very large and broad ſhell of the bivalve kind, ſometimes meaſuring 12 or 14 inches over, but thoſe of eight inches are more frequent: it is not very deep; on the outſide it is of a duſky brown, and within of a very beautiful white, with tinges of ſeveral other colours, as expoſed in different directions to the light. Beſides this ſhell, there are many others that are found to produce pearls; as the common oyſter, the muſcle, the pinna marina, and ſeveral others, the pearls of which are often very good, but thoſe of the true Indian berberi, or pearl-oyſter, are in general ſuperior to all. The ſmall or ſeed-pearls, alſo called ounce-pearls, from their being ſold by the ounce, and not by tale, are vaſtly the moſt numerous and common; but as in diamonds, among the multitudes of ſmall ones, there are ſmaller numbers of larger found, ſo in pearls there are larger and larger kinds; but as they increaſe in ſize, they are proportionably leſs frequent, and this is one reaſon of their great price.

Falſe PEARLS, are factitious pearls, reſembling the true ones in water or colour, commonly called beads.

Theſe were anciently made of glaſs, with a kind of tincture of quickſilver in the inſide; afterwards they uſed wax, covered over with a fine brilliant fiſh glue.

Method of making falſe PEARLS. This is now much uſed in France, and is the curious invention of the Sieur Janin; that ingenious artiſt having obſerved, that the ſcales of the bleak, a fiſh found plentifully in the river Marne, had not only all the luſtre of the real pearl, but, that after beating them to powder in water or iſing-glaſs, they returned to their former brilliancy upon drying; he bethought himſelf of ſetting a little maſs thereof in the cavity of a bead or grain of girſol, which is a kind of opal or glaſs, bordering much on the colour of pearl. With a little glaſs tube ſix or ſeven inches long, and a line and a half in diameter, but very ſharp at one end, and a little crooked, he introduced the matter, by blowing it, after having taken up a drop with the pointed extremity; and, to ſpread it throughout the inner circumference, he contented himſelf to ſhake it gently a long time, in a little oſier-baſket lined with paper.

The pulverized ſcales reſume their luſtre as they dry; and, to increaſe this luſtre in winter, they lay the beads in a hair-ſieve or bolting-cloth, which they ſuſpend to the cieling, and underneath, at ſix feet diſtance, lay heaps of hot aſhes. In ſummer they are ſuſpended in the ſame manner, but without any fire. And now nothing remains but to ſtop up the aperture, which is done with melted wax, conveyed into it with a tube like that uſed in introducing the diſſolved ſcales. After cleaning off the ſuperfluous wax, the pearls are perforated with a needle, and then ſtrung; and thus they become necklaces, which the ladies now generally wear in defect of true pearl.

Mother of PEARL, *Auris marina*, in natural hiſtory, is the ſhell of a little ſea-fiſh of the oyſter kind, not of the pearl oyſter. It is very ſmooth withinſide, and of the whiteneſs and water of pearl itſelf, and it has the ſame luſtre on the outſide, after the firſt laminæ have been cleared off with aquafortis and the lapidaries drill. It is uſed in inlaid works, and in ſeveral toys, as ſnuff-boxes, &c.

Wens of PEARLS, certain excreſcences, in form of half pearls, ſometimes found in the bottoms of pearl-ſhells. The lapidaries ſaw off theſe protuberances to join them together, and uſe them in ſeveral works of jewelry.

PEARL, in heraldry, is uſed by ſuch as blazon with precious ſtones inſtead of colour and metals, for argent or white.

PEARL, *Pin*, *Web*, in medicine, a thick film or ſpeck over the eye.

PEASE, a genus of plants cultivated in every part of England, both in the field and kitchen-garden. We ſhall lay down the beſt methods for cultivating them in the kitchen-garden, from Mr. *Miller*'s Gardener's Dictionary, and then proceed to give the beſt inſtructions in our power for obtaining large crops in the field.

With regard to the kitchen. The diſtance between the rows of peas ſhould be proportioned to the ſize to which they grow. The channels in which they are ſown ſhould be about two inches deep; and the quickeſt and moſt regular way to perform this work is, to draw a ſmall hoe, directed by a line, along the ſurface of the ground, ſo as to open a drill; then to ſcatter the ſeeds in this furrow, and to earth them over with the help of a rake. By this means they will be well and equally covered; which is eſſentially neceſſary, becauſe if any of them lie above ground, they will attract mice, rooks, pigeons, and other birds, which will then ſoon find out the reſt, and deſtroy the whole plantation. The chief trouble after ſowing them is, to ſtick the larger ſorts which require ſupport, to keep the plants clear from weeds, and to earth them up; both which laſt parts of their culture are very eaſily, readily, and effectually executed, when a ſmall plow can be introduced between the rows.

The names of the principal ſorts of garden peas now cultivated in England, and the order in which they naturally become fit for gathering, are as follow, viz. the golden hotſpur, the Charlton hotſpur, the Reading hotſpur, the maſter's hotſpur, the Eſſex hotſpur, the dwarf pea, the ſugar pea, the Spaniſh morotto, the nonpareil, the ſugar dwarf, the fickle pea, the marrowfat, and the roſe, or crown pea: for the rouncival, the common white pea, the grey pea, the pig pea, and ſome other large winter peas, as they are commonly called, ſeldom find a place but in the field. But we muſt here obſerve, that ſeveral of the above-mentioned, which gardeners and ſeed-men have diſtinguiſhed by different appellations, are, in fact, only ſeminal variations, which will degenerate into their original ſtate in a few years, if they are not very carefully managed. The only way to prevent this, is to rogue them, as the gardeners term it, that is to ſay, to examine attentively thoſe which are intended for ſeeds, at the time of their beginning to flower (but before the flowers are open) and to draw out all the bad plants from among the good ones, that the farina of the former may not impregnate the latter, and thereby make them change. It is chiefly owing to this particular care, and to the ſelecting of thoſe plants which bloſſom earlieſt, that the culture of peas has been very greatly improved of late years around this metropolis, and that, from a continuation of the ſame induſtrious endeavours to bring it to ſtill greater perfection, we may hope to ſee yet forwarder varieties of this moſt uſeful ſpecies of pulſe.

The hotſpur pea is, naturally, the earlieſt of all, and therefore we have named it firſt: but the gardeners about London raiſe, by art, from the dwarf pea, tranſplanted into a hot-bed, a crop which anticipates the ſpontaneous growth of the other. To effect this, they ſow their dwarf peas in warm borders, under walls or hedges, about the middle of October; and when the plants are riſen, they draw the earth up gently around their ſtems, to protect them from the froſt. They let them remain where they were ſown till the latter end of January, or the beginning of February (ſtill continuing to earth them up from time to time, as they advance in growth, and covering them with dry haulm, or ſtraw, in caſe of ſevere froſt) and then remove them into a hot-bed made of good, new, well fermenting dung, properly mixed, that the heat may not be too great. This dung is laid from two to three feet thick, according as the ſeaſon is more or leſs advanced; it is covered with ſix or eight inches deep of light and freſh, but not too rich earth; the frames, about two feet high at their back, and 14 inches deep in front, are then put on, and covered with their glaſſes which are propped up every day, during three or four days, to let the riſing ſteam paſs off; and when the bed is become of a moderate temperature, the plants are taken up as carefully as poſſible, to preſerve the earth about their roots, and planted in it about an inch aſunder in rows two feet diſtant from each other. They are then watered a little and ſhaded, till they have taken root, and aired whenever the ſeaſon is favourable, leſt they ſhould be drawn up very weak, grow mouldy, and decay. Their ſtems are alſo earthed up as they advance in height, and they are kept perfectly clear from weeds. This firſt watering ſhould be gentle, and dealt out ſparingly; for too much of it would make them grow rank, and ſometimes rot them off at their ſhanks, juſt above the ground. If the weather becomes very hot, the glaſſes are covered with mats in the day-time, to ſcreen the plants from the too great violence of the ſun; and when they begin to fruit, they are watered oftener and more copiouſly than before; for they have nearly done growing by that time, and refreſhing of them frequently will make them produce the greater number of pods

The dwarf pea is preferred for this purpoſe, becauſe it is more eaſily confined within frames than any other ſort. The reaſon for ſowing it in the common ground, and afterwards tranſplanting it into a hot-bed, is, to check its growth, and thereby make it bear the more in a ſmaller compaſs.

The hotſpur, of which the ſorts before enumerated differ very little from each other, except in the forwardneſs of their fruit, in which the golden and the Charlton are earlieſt, ſucceeds the hot-bed crop of the dwarf pea. But it is neceſſary to obſerve here, that both theſe kinds of hotſpur peas are particularly apt to degenerate, and become later in their podding, if they are cultivated in the ſame ground for three or four years running: wherefore the beſt way is to change their ſeeds annually, and always to prefer ſuch as come from a colder ſituation and a poorer ſoil, than the place where they are to be ſown, for theſe will be earlieſt in the ſpring; and if they are procured from a diſtant part, it will be ſo much the better.

Theſe peas muſt alſo be ſown in warm borders, about a fortnight after the former, that is to ſay, towards the end of October. When the plants are a few inches high, they ſhould be earthed up as before directed, to defend their ſtems from froſt; and if the winter be very ſevere, they ſhould be covered with haulm, or ſome other light covering: but this muſt be taken off as ſoon as the weather grows mild, leſt it ſhould draw them up weak and tender; and the weeding and earthing up ſhould be repeated as they advance in growth, but with care not to bury their leaves, for that might rot their ſtems, eſpecially in wet ſeaſons. Both of theſe works muſt be very carefully performed in the ſpring: and this is likewiſe the moſt proper time to kill the ſlugs, which, of all vermin, do the greateſt injury to peas. They lie all day in the hollows of the earth, near the ſtems of the plants, and come out in the night, to the ſometimes total ruin of the crop. They abound moſt in wet ſoils, and in neglected grounds over-run with weeds: for which reaſon they have the leaſt chance of finding ſhelter where the new huſbandry is well practiſed. Mr. Miller recommends, as the beſt method he could ever find to deſtroy them, to clear the ground thoroughly well around the plants, and there, very early in a fine mild morning, when theſe inſects are got abroad, to ſlake a quantity of lime, and ſtrew it over the ground hot, and pretty thick. This will kill the ſlugs wherever it falls upon them, and will not do much hurt to the peas, if they be not overloaded with it.

If this crop does well, it will immediately ſucceed that of the dwarf peas on the hot-bed: but leſt it ſhould miſcarry, it will be right to ſow two other crops, at the diſtance of about a fortnight or three weeks from each other. Theſe will ſuffice till the ſpring, when more crops of the ſame ſort may be ſown every fortnight, and by this means the early peas will be continued through the ſeaſon.

About the middle of February, ſome of the Spaniſh morotto, which is a great bearer, and a hardy pea, may be ſown in a clear open ſpot of ground, for the next uſe of the family. The rows of theſe, which are a larger kind, ſhould be four feet aſunder, and the peas ſhould be dropped at about an inch from each other in the drills.

To ſucceed theſe, another ſpot of ground ſhould be ſown about the end of February, either with the ſame, or any other large ſort of pea, and theſe ſowings ſhould be continued every fortnight, till the middle or latter end of May; only obſerving to allow diſtances proportioned to the ſize of the pea at its full growth. Thus marrowfats, for example, ſhould not ſtand nearer than four feet and an half from row to row, and the roſe pea ſhould be at leaſt eight or ten inches aſunder in the rows: for all peas, (and the caſe is exactly the ſame in regard to every other plant) will run up in height, and yield but little fruit, if they are too much crowded.

When theſe larger ſorts of peas (which muſt be carefully weeded and earthed up as before directed) are grown

about eight or ten inches high, ſome bruſh-wood ſhould be ſtuck up cloſe to them, to prevent their trailing upon the ground, which is very apt to rot theſe kinds in particular, eſpecially in wet ſeaſons: and another great advantage ariſing from their being thus ſupported, is that the air has then a free current between them, which will keep their bloſſoms from falling off before their time, and they will conſequently bear much better than they could if left trailing upon the ground. There will alſo, by this means, be proper room to hoe between the rows, and to paſs between them in order to gather the peas when they are ripe.

The marrowfat is the beſt taſted of all the large kinds of peas, and it will continue good till the end of Auguſt, if it be planted in a ſtrong ſoil. The other large growing ſorts may be raiſed for the common uſe of the family, becauſe they yield the moſt plentifully, and can endure the greateſt drought: but the early kinds are by far the ſweeteſt. It will therefore be well worth the maſter's while to ſee that a crop of theſe, and particularly of the early hotſpur, is ſown every fortnight, to ſupply at leaſt his own table during the ſeaſon.

All the dwarf peas yield plentifully, if the weather be not over dry; but they ſeldom continue to bear long. As they rarely ſurpaſs the height of one foot, or ſpread wider than ſix inches, about two feet and an half may be a ſufficient ſpace for weeding and ſtirring of the ground between their rows, in which they need not be ſet above an inch aſunder. Among theſe may be claſſed the fickle pea, or ſugar pea, which is much cultivated in ſeveral foreign countries, but is ſeldom propagated here, except by curious gentlemen, for their own table. The pods of this pea are crooked and ill-ſhaped, but extremely ſweet when boiled with their unripe fruit in them, as is the general way of dreſſing them; for they have not any tough inſide ſkin, like the pods of other peas. It is ſtrange that this ſort is not yet to be met with in our markets; unleſs the reaſon be, that the trading gardeners, who furniſh them, find that their profit will not pay for the trouble and expence of defending theſe peas from birds, which are ſo exceſſively fond of them, that they will ſoon devour a whole crop, if they are not very carefully kept off. If theſe peas are planted in April, they will be fit for gathering at Midſummer. Their pods, when they are very young, and their tendrils, have an agreeable acid flavour in ſallets; as have alſo the young tendrils of the hop and the vine.

A general rule to be obſerved in the planting of peas, is, that the later they are ſown, the ſtronger and moiſter the ſoil ſhould be.

Having thus delivered the beſt method for cultivating peas in the kitchen-garden, we ſhall proceed to make ſuch obſervations as may be of uſe for obtaining large crops in the open field.

Mr. Liſle, for the greater eaſe and more certain guidance of country people, who are apt to be perplexed by a long liſt of particular names of different ſorts of field-peas, and of their ſeveral numerous varieties, judiciouſly ranges them under two general heads, viz. the tender and the hardy ſmall ſort, and the tender and the hardy great ſort; under the one or the other of which claſſes he thinks all kinds of peas may properly be ranked, becauſe they equally agree or diſagree with the ſame ſoil. The tender pea, for example, is improper for a cold country, or, which amounts to the ſame, for cold ground in a warm country; and the large pea, by reaſon of its great haulm, is not proper for ſtrong rich land, becauſe its haulm will there increaſe to ſo great a length, that it will not be able to bear pods. His own experience in the year 1704, ſatiſfied him fully, that the beſt way to make peas pod well, is to ſow them on a mellow mould, rendered light by plowing: and he thinks it right to roll the ground ſoon after they are ſown.

Even the moſt general directions, and therefore theſe cannot but be of ſervice to the huſbandman: but more particular obſervations and actual experiments properly diverſified, are ſtill much wanted in the culture of this, and indeed of all other podded grains, and ſucculent plants, whoſe importance, as deſtroyers of weeds, improvers of land, and excellent preparers of it for other crops, is eſtabliſhed beyond diſpute. It is even a rule with farmers, not to ſow the ſame land a ſecond time with peas, till ſix, or at leaſt five years after the former crop of the ſame kind; becauſe, till then, the ground on which they grew will continue ſo rich as to make them run luxuriantly to haulm, in a manner inconſiſtent with the bearing of much fruit.

The common white pea does beſt on light ſandy land, or on a rich looſe ſoil. It is generally ſown with a broad caſt, and only harrowed in. Three buſhels of theſe peas are the uſual allowance of ſeed for an acre of ground; and the common time for ſowing them is about the latter end of March, or the beginning of April, on warm land: but a fortnight or three weeks later than this, will be early enough on cold ground. If ſown in drills, which is by far the beſt way, a buſhel and a half of ſeed will be full enough for an acre; and, when thus ſet regularly, the ground may be ſtirred with a hoe, to deſtroy the weeds, and earth up the plants, by which they will be greatly improved, and the peas eaſier to cut in autumn, when they are ripe.

The green and the maple rouncivals require a ſtronger ſoil than the white, and ſhould be ſown a little later in the ſpring, alſo in drills, but further aſunder, that is to ſay, at the diſtance of at leaſt two feet and a half, or three feet from each other, becauſe they are apt to grow rank, eſpecially in a wet ſeaſon. The ground between theſe rows ſhould be ſtirred two or three times with a hoe, which will not only deſtroy the weeds, but, by earthing up the peas, will greatly improve them, and alſo render the land fitter to receive whatever crop is put on it the following ſeaſon.

The grey and other large winter peas, as they are called, are ſeldom cultivated in gardens, becauſe they require a great deal of room. The beſt time for ſowing of theſe is about the beginning of March, when the weather is pretty dry; for if they are ſown in a very wet ſeaſon, they are apt to rot, eſpecially if the ground be cold. The diſtance between the rows ſhould here be at leaſt three feet, and theſe peas ſhould be ſown very thin in the rows: for if they are ſown too thick, their haulm will ſpread ſo as to fill the ground, and they will ramble over each other; by which means many of the plants will be rotted, and hindered from bearing. The common allowance of theſe large peas is two buſhels to an acre: but that is certainly more than conſiſts with the very thin ſowing which is beſt for them.

The grey peas, in particular, thrive beſt on a ſtrong clayey land, in which they are commonly ſown under furrow. But by this method of ſowing, large peas, eſpecially, are always planted too thick, and at unequal depths, which prevent their coming up regularly. For this reaſon, among many others, all rank-growing plants ſhould undoubtedly be ſown in drills, in which their ſeeds will be diſtributed much more equally in all reſpects.

If only a ſmall ſpot of ground be planted with theſe peas, a channel about two inches deep may be made with a hoe, guided by a line, the ſeeds may be dropped therein, and the earth may be drawn over them with a rake. By this means they will be covered equally, and with tolerable diſpatch, though not ſufficient for large fields, where, for this reaſon, a ſhallow furrow is commonly made with the plough, the ſeeds are ſcattered in it, and the earth is harrowed over them. The greateſt trouble then remaining is to keep the plants clear from weeds, and lay the earth up to their roots, which, in countries where labour is dear, is very expenſive to have done with the hand-hoe, but may be eaſily effected by drawing a horſe-hoe between the rows. This will entirely eradicate the weeds, ſtir the ſoil, render it mellow, and greatly promote the proper growth of the plants.

PEAT, a kind of turf uſed for fuel in ſeveral countries. In Holland they have a way of charring peat, ſo that it may ſerve for fuel in ſeveral chymical operations; but this manner of charring is not yet known in ſeveral countries where, perhaps, peat might be found. See Moss.

PEBBLES, *Calculi*, ſmall ſtones, compoſed of a cryſtalline matter debaſed by earths, and hence ſubject to veins, clouds, and other variegations. See Crystal.

PECCANT, in medicine, a term uſed for thoſe humours of the body which offend either by their quantity or quality.

PECK, a meaſure of capacity, four of which make a buſhel.

PECTIS, in botany, a genus of plants, whoſe common corolla is radiated, the proper corollulæ are hermaphrodite,

phrodite, and funnel-ſhaped: the female florets which form the rays, are ligulated, and ovate; the ſeeds are contained in the cup, they are ſolitary, linear, and crowned with a bearded down.

PECTORAL, an epithet for medicines good for diſorders of the breaſt and lungs. The ordinary intention of theſe medicines is either to attenuate or thicken the humours of theſe parts, and to render them fit to be expectorated or ſpit out. See EXPECTORANTS.

PECTORALIS, in anatomy, a pair of muſcles which poſſeſſes almoſt the whole breaſt, and ſerves to move the arm forwards.

PECULIAR, in the canon law, ſignifies a particular pariſh or church that has juriſdiction within itſelf for granting probates of wills, and adminiſtrations, exempt from the ordinary or biſhop's courts.

Court of PECULIARS, is a court in which the affairs belonging to peculiars are tranſacted.

PECUNIARY, a term applied to the puniſhment of offenders by mulct or fine.

PEDAGOGUE, or PÆDAGOGUE, a tutor or maſter to whom is committed the diſcipline and direction of a ſcholar, to be inſtructed in grammar and other arts.

PEDALS, the largeſt pipes of an organ, ſo called becauſe played and ſtopped with the foot. The pedals are made ſquare, and of wood; they are uſually 13 in number. They are of modern invention, and ſerve to carry the ſounds an octave deeper than the reſt.

PEDANT, is uſed for a rough unpoliſhed man of letters, who makes an impertinent uſe of the ſciences, and abounds in unſeaſonable criticiſms and obſervations. Dacier defines a pedant, a perſon who has more reading than good ſenſe; and Malebranche deſcribes him, as a man full of falſe erudition, who makes a parade of his knowledge, and is ever quoting ſome Greek or Latin author, or hunting back to a remote etymology.

PEDERERO, PETERERO, or PATERERO, a ſmall piece of ordnance, uſed on board a ſhip for diſcharging nails, broken iron, or partridge ſhot, on an enemy attempting to board. They are generally open at the breech, and their chamber made to take out to be loaded that way.

PEDESTAL, in architecture, that which ſuſtains a column, and ſerves it as a ſtand, or baſe. The pedeſtal, which the Greeks call ſtylabetes and ſtereobates, conſiſts of three principal parts, viz. a ſquare trunk or die, which makes the body; a corniche, the head; and a baſe, the foot of the pedeſtal. The pedeſtal is properly an appendage to a column, not an eſſential part of it; though M. Le Clerc thinks it is eſſential to a complete order. There are as many kinds of pedeſtals as there are of orders of columns, viz. the Tuſcan, Dorick, Ionick, Corinthian, and Compoſite.

PEDIÆN, in antiquity, one of the three diviſions in Athens, which was the middle part of that city, as being in a plain between the other two; the one called diacrian, as being on the deſcent of a hill; and the other paralian, as being on the ſhore.

PEDIÆUS, in anatomy, the ſecond of the extenſor muſcles of the foot. See FOOT.

PEDICLE, *Pediculus*, in botany, the foot-ſtalk, whereby the leaf, fruit, or flower, is ſuſtained and connected to its branch or ſtem.

PEDICULARIS MORBUS, *Pediculatio*, in medicine, the louſy evil, a diſtemper ariſing from ſome uncommon corruption in the body, which generates infinite quantities of lice on the ſkin.

PEDIGREE, the ſame with deſcent or genealogy.

PEDIMENT, in architecture, a kind of low pinnacle that crowns an ordonnance, or finiſhes a frontiſpiece, being an ornament placed over gates, doors, windows, niches &c. It is ordinarily of a triangular form, but ſometimes makes an arch of a circle. Vitruvius obſerves, that the pinnacles of the plaineſt houſes gave architects the idea of this noble part, which ſtill retains the appearance of its original.

The parts of a pediment are the tympanum and corniche. The firſt is the pannel naked, or area of the pediment incloſed between the corniche which crowns it, and the entablature which ſerves it as a baſe or ſocle. Architects have indeed taken a great deal of liberty, as to the form of this member. The moſt beautiful, according to Daviler, is where its height is about $\frac{1}{5}$ of the length of its baſe.

Vitruvius calls the pediment faſtigia, which ſignifies a roof raiſed or pointed in the middle, which form, among the Romans, was peculiar to temples. All their dwelling-houſes are covered in the platform manner; and it is obſerved by Salmaſius on Solin, that Cæſar was the firſt who obtained leave to roof his houſe with a ridge or deſcent after the manner of temples.

The pediment is uſually triangular, and ſometimes an equilateral triangle, called alſo a pointed pediment, is ſometimes circular, though it has been obſerved by Mr. Felibien, that we have no inſtance of round pediments in the antique, beſides thoſe in the chapels of the Rotundo.

Sometimes its upper corniche is divided into three or four ſides or right lines. Sometimes the corniche is cut or open a-top, which is an abuſe introduced by the moderns, particularly Michael Angelo; for, the deſign of this part, at leaſt over doors, windows, &c. being chiefly to ſhelter thoſe underneath from the rain, to leave it open in the middle is to fruſtrate its ends. Sometimes the pediment is formed of a couple of rolls or wreaths like two conſoles joined together. Sometimes the pediment has no baſe, or its lower corniche is cut out, all but what is beſtowed on two columns or pilaſters, and on theſe is raiſed an arch or ſweep, inſtead of an entablature; of which Serlio gives an inſtance in the antique in a Corinthian gate at Foligni, in Umbria; and Daviler in a modern one in the church of St. Peter, at Rome.

Under this kind of pediments come thoſe little arched corniches, which form pediments over doors and windows, ſupported by two conſoles, inſtead either of entablature or columns. Sometimes the pediment is made double, i. e. a leſs pediment is made in the tympanum of a larger, on account of ſome projecture in the middle, as in the frontiſpiece of the church of the Great Jeſus at Rome: but this repetition is accounted an abuſe in architecture, although it be authorized by very good buildings, as the large pavilion of the Louvre, where the cariatides ſupport three pediments one in another. Sometimes the tympanum of the pediment is cut out or left open to let in light, as is ſeen under the port-end of the Capitol of Rome.

PEDOBAPTISM, infant baptiſm.

PEDOMETER, a mechanical inſtrument, called way-wiſer, in form of a watch, conſiſting of various wheels, with teeth catching in one another, all diſpoſed in the ſame plane; which, by means of a chain or ſtring faſtened to a man's foot, or a chariot wheel, advances a notch each ſtep, or each revolution of the wheel: ſo that, the number being marked on the edge of each wheel, one may number the paces, or meaſure exactly the diſtance from one place to another.

PEDUNCLE, among botaniſts, the ſame with Pedicle. See PEDICLE.

PEE, in mining, is uſed for the place where two veins meet and croſs one another.

PEER, in general, ſignifies an equal, or one of the ſame rank and ſtation: hence in the acts of ſome councils we find, theſe words with the conſent of our peers, biſhops, abbots, &c. Afterwards the ſame term was applied to the vaſſals or tenants of the ſame lord who were called peers, becauſe they were all equal in condition, and obliged to ſerve and attend him in his courts; and peers in fiefs, becauſe they all held fiefs of the ſame lord.

The term peers is now applied to thoſe who are impannelled in an inqueſt upon a perſon for convicting or acquitting him of any offence laid to his charge: and the reaſon why the jury is ſo called, is, becauſe by the common law, and the cuſtom of this kingdom, every perſon is to be tried by his peers or equals, a lord by the lords, and a commoner by commoners.

PEER *of the Realm*, a noble lord who has a ſeat and vote in the houſe of lords, which is alſo called the houſe of peers.

PEERESS, a woman who is noble by deſcent, creation, or marriage. If a peereſs, by deſcent or creation, marries a perſon under the degree of nobility, ſhe ſtill continues noble: but if ſhe obtains that dignity only by marriage, ſhe loſes it on her afterwards marrying a commoner; yet, by the curteſy of England, ſhe always retains the title of her nobility. No peereſs can be arreſted for debt or treſpaſs; for though, on account of their ſex, peereſſes cannot ſit in the houſe of lords, yet they enjoy the

the privileges of peers, and therefore all peereſſes by birth, are to be tried by their peers.

PEGASUS, among the poets, a horſe imagined to have wings, being that whereon Bellerophon was fabled to be mounted, when he engaged the chimæra.

The opening of the fountain Hippocrene, on mount Helicon, is aſcribed to a blow of Pegaſus's hoof. Pegaſus was feigned to have flown away to heaven, where it became a conſtellation.

PEGASUS, in aſtronomy, a conſtellation of the northern hemiſphere, in form of a flying horſe. The ſtars in this conſtellation, in Ptolemy's catalogue, are 20, in Tycho's 19, and in the Britannick catalogue 93.

PELAGIANS, a Chriſtian ſect who appeared about the latter end of the fourth, or the beginning of the fifth century.

Pelagius, the author of this ſect, was born in Wales, and ſome ſay his name was Morgan, which in the Welch language ſignifies ſea-born; from whence he had his Latin name Pelagius. Some of our ancient hiſtorians pretend that he was abbot of Bangor; but this is impoſſible, becauſe the Britiſh monaſteries were of a later date. St. Auſtin gives him the character of a very pious man, and a Chriſtian of no vulgar rank: according to the ſame father, he travelled to Rome, where he aſſociated himſelf with perſons of the greateſt learning and figure, and wrote his commentaries on St. Paul's Epiſtles, and his letters to Melania and Demetrias; but being charged with hereſy, he left Rome, and went into Africa, and from thence to Jeruſalem, where he ſettled. He died ſomewhere in the Eaſt, but where is uncertain. He was charged with maintaining the following doctrines: 1. That Adam was by nature mortal, and whether he had ſinned or not, would certainly have died. 2. That the conſequences of Adam's ſin were confined to his own perſon. 3. That new-born infants are in the ſame condition with Adam before the fall. 4. That the law qualified men for the kingdom of heaven, and was founded upon equal promiſes with the Goſpel. 5. That the general reſurrection of the dead does not follow in virtue of our Saviour's reſurrection. 6. That the grace of God is given according to our merits. 7. That this grace is not granted for the performance of every moral act; the liberty of the will, and information in points of duty being ſufficient, &c. Pelagius's ſentiments were condemned by ſeveral councils in Africa, and by a ſynod at Antioch.

There was alſo a ſect of Semi-Pelagians; who, with the orthodox, allowed of original ſin; but denied that the liberty of the will could be ſo far impaired thereby, that men could not of themſelves do ſomething, which might induce God to afford his grace to one more than another: and as to election, they held, that it depended on our perſeverance; God chooſing only ſuch to eternal life, as continued ſtedfaſt in the faith.

PELECINUS, a plant, otherwiſe called biſerrula. See BISERRULA.

PELICAN, *Pelicanus*, in ornithology, a genus of birds, of the order of the anſeres, the beak of which is very long, crooked, and unguiculated at the extremity: its ſides are not denticulated, and the anterior part of the head towards the throat is naked.

PELICAN, in chymiſtry, a kind of double glaſs veſſel, uſed in diſtilling liquors by circulation: it conſiſts of a cucurbit and alembick head, with two tubes bending into the cucurbit again.

PELLETS, in heraldry, thoſe roundles that are black, called alſo ogreſſes and gun-ſtones, and by the French torteaux de ſable.

PELLICLE, among phyſicians, &c. denotes a thin film, or fragment of a membrane. When any liquor is evaporated in a gentle heat, till a pellicle ariſe at top, it is called an evaporation to a pellicle; wherein there is juſt liquor enough left to keep the ſalts in fuſion.

PELLITORY, *Parietaria*, in botany. See the article PARIETARIA.

PELLUCID, the ſame with diaphanous, or tranſparent. See TRANSPARENCY.

PELVIS, in anatomy, the lower part of the cavity of the abdomen, thus called from its reſemblance to a baſon, or ewer, in Latin called pelvis. It is formed by the oſſa ilia and iſchia, the os ſacrum, the os coccygis, and the oſſa pubis. See INNOMINATA OSSA.

The pelvis is much larger in women than in men, to give room for the growth, &c. of the fœtus.

PELVIS *of the Kidneys*, a membranaceous cavity in the kidneys, which ſends out ſeveral proceſſes called the tubuli of the pelvis, and ſurrounds the renal papillæ.

PEN, or PENSTOCK. See PENSTOCK.

PENANCE, a puniſhment, either voluntary or impoſed by authority, for the faults a perſon has committed.

PENCIL, an inſtrument uſed by painters for laying on their colours. Pencils are of various kinds, and made of various materials; the larger ſorts are made of boars-briſtles, the thick ends of which are bound to a ſtick, bigger or leſs, according to the uſes they are deſigned for: theſe, when large, are called bruſhes. The finer ſorts of pencils are made of camels, badgers, and ſquirrels-hair, and of the down of ſwans; theſe are tied at the upper end with a piece of ſtrong thread, and incloſed in the barrel of a quill. All good pencils, on being drawn between the lips, come to a fine point.

PENDANT, an ornament hanging at the ear, frequently conſiſting of diamonds, pearls, and other precious ſtones.

PENDANT, in heraldry, denotes the parts hanging down from the label, to the number of three, four, five, or ſix at moſt. They muſt be ſpecified in blazoning, when more than three. They reſemble the drops at the bottom of the triglyphs in the Dorick frieze.

PENDANTS, among floriſts, a kind of ſeeds growing on ſtamina, or chives, ſuch as thoſe in the middle of tulips, lilies, &c.

PENDANTS *of a Ship*, thoſe long ſtreamers cut pointing towards the end, and there divided into two parts, hung out at the heads of maſts, &c. They are uſed ſometimes for ſhew, and for diſtinction of ſquadrons, &c.

PENDANT, *pennant*, is a ſhort rope, which at one end is faſtened to the head of the maſt, yard, or clue of the ſail, and at the other end hath a block and ſhiver, to receive ſome running rope into.

PENDENTIVE, in architecture, the whole body of a vault ſuſpended out of the perpendicular of the wall, and bearing againſt the arboutants.

This is uſually of brick, or ſoft ſtone; but care muſt be taken, that the joints of the maſonry be always laid level, and in right lines proceding from the ſweep whence the riſe is taken. The joints too muſt be made as ſmall as poſſible, to ſave the neceſſity of filling them up with ſlips of wood, or uſing much mortar.

PENDULOUS, hanging down; a name which botaniſts give to thoſe heads of flowers that hang downwards, their ſtalks not being able to ſuſtain them upright.

PENDULUM, in mechanicks, any heavy body ſo ſuſpended, as that it may vibrate backwards and forwards, about ſome fixed point, by the force of gravity.

A pendulum is any body, as B (*plate* LXII. *fig.* 4.) ſuſpended upon, and moving about a point A as a centre. The nature of a pendulum conſiſts in the following particulars: 1. The times of the vibrations of a pendulum, in very ſmall arches, are all equal. 2. The velocity of the bob, in the loweſt point, will be nearly as the length of the chord of the arch which it deſcribes in the deſcent. 3. The times of vibration in different pendulums, A B, A C, are as the ſquare roots of their lengths. 4. The time of one vibration is to the time of the deſcent, through half the length of the pendulum, as the circumference of a circle to its diameter. 5. Whence the length of a pendulum, vibrating ſeconds, will be found 39 inches nearly; and of one half ſecond pendulum nine, $\frac{3}{4}$ inches. 6. An uniform homogeneous body B G (*plate* LXII. *fig.* 3.) as a rod, ſtaff, &c. which is one-third part longer than a pendulum A D, will vibrate in the ſame time with it.

From theſe properties of the pendulum we may diſcern its uſe as an univerſal chronometer, or regulator of time, as it is uſed in clocks, and ſuch-like machines. By this inſtrument alſo we can meaſure the diſtance of a ſhip, by meaſuring the interval of time between the fire and the ſound of the gun; alſo the diſtance of a cloud, by numbering the ſeconds, or half ſeconds, between the lightning and thunder. Thus, ſuppoſe between the lightning and thunder we number 10 ſeconds; then, becauſe ſound paſſes through 1142 feet in one ſecond, we have the diſtance of the cloud equal to 11420 feet. Again, the height of any room, or other object, may be mea-

 ſured

fured by a pendulum vibrating from the top thereof. Thus, ſuppoſe a pendulum from the height of a room vibrates once in three ſeconds; then ſay, as 1 is to the ſquare of 3, viz. 9, ſo is 39,2 to 352,8 feet, the height required. Laſtly, by the pendulum we diſcover the different force of gravity on diverſe parts of the earth's ſurface, and thence the true figure of the earth.

The greateſt inconvenience attending this moſt uſeful inſtrument is, that it is conſtantly liable to an alteration of its length, from the effects of heat and cold, which very ſenſibly expand and contract all metalline bodies.

When pendulums were firſt applied to clocks, they were made very ſhort; and the arches of the circle being large, the time of vibration through different arches could not in that caſe be equal; to effect which, the pendulum was contrived to vibrate in the arch of a cycloid

From what has been ſaid under the article Cycloid, it appears that if AC (*fig.* 5.) be the length of a pendulum ſo diſpoſed as to vibrate between the two ſemicycloids AD and AL, the bob will deſcribe in its motion the cycloid DCL. The properties of which motion will now eaſily appear: for, with reſpect to the velocity acquired by deſcending through any arch RC or BC, it is always as $\sqrt{OC}$ which is as the chord $SC=\frac{1}{2}RC$; conſequently the velocity at C is every where as the ſpace paſſed through, or as the arch of the cycloid deſcribed in the deſcent.

But ſince it is always $S=TV$, in all kinds of motion; if in any caſe S be as V, it is evident T muſt be a given quantity, or always the ſame. That is, when the ſpaces $(S, s,)$ are as the velocities $(V, v,)$ the times $(T, t,)$ will be always equal; and, therefore, all the arches of a cycloid, great or ſmall, are deſcribed in equal times. Alſo the time of vibration in the cycloid is to the time of deſcent through half its length, as the circumference of a circle to its diameter.

In all that has been hitherto ſaid, the power of gravity has been ſuppoſed conſtantly the ſame. But, if the ſaid power varies, the lengths of pendulums muſt vary in the ſame proportion, in order that they may vibrate in equal times; for we have ſhewn, that the ratio of the times of vibration and deſcent through half the lengths is given, and conſequently the times of vibration and deſcent through the whole length is given: but the times of vibrations are ſuppoſed equal, therefore the times of deſcent through the lengths of the pendulum are equal. But bodies deſcending through unequal ſpaces, in equal times, are impelled by powers that are as the ſpaces deſcribed, that is, the powers of gravity are as the lengths of the pendulums.

The greateſt inconvenience attending this moſt uſeful inſtrument is, that it is conſtantly liable to an alteration of its length, from the effects of heat and cold, which very ſenſibly expand and contract all metalline bodies.

To remedy this inconvenience, the common method is by applying the bob of the pendulum with a ſcrew, ſo that it may at any time be made longer or ſhorter, according as the bob is ſcrewed upwards or downwards, and thereby the times of its vibrations kept always the ſame.

Again, if a glaſs or metalline tube, uniform throughout, filled with quickſilver, and 58.8 inches long, were applied to a clock, it would vibrate ſeconds $39.2=\frac{2}{3}$ of 58.8, and ſuch a pendulum admits of a twofold expanſion and contraction, viz. one of the metal, and the other of the mercury, and this will be at the ſame time contrary, and therefore will correct each other. For, by what we have ſhewn, the metal will extend in length with heat, and ſo the pendulum will vibrate ſlower on that account. The mercury alſo will expand with heat, and ſince by this expanſion it muſt extend the length of the column upward, and conſequently raiſe the centre of oſcillation; ſo that, by this means, its diſtance from the point of ſuſpenſion will be ſhortened, and therefore the pendulum on this account will vibrate quicker: wherefore, if the circumſtances of the tube and mercury are ſkilfully adjuſted, the time of the clock might, by this means, for a long courſe of time, continue the ſame, without any ſenſible gain or loſs.

This is the invention of the late ingenious Mr. Graham, in the year 1721, who made a clock of this ſort, and compared it with one of the beſt of the common ſort for three years together, and found the errors of the former but about $\frac{1}{8}$ part of the latter; of which the reader may ſee a further account in the Philoſophical Tranſactions, No. 392. It is what is now called Mr. Graham's quickſilver pendulum.

But beſides the irregularities ariſing from heat and cold, pendulum-clocks are liable to others from friction and foulneſs; to obviate which, Mr. Harriſon has ſeveral excellent contrivances, whereby his clocks are almoſt entirely free from friction, and never need be cleaned. See Friction.

PENETRATION, *Penetratio*, the act whereby one thing acts upon another, or takes up the place already poſſeſſed by another.

PENGUIN, in ornithology, the name of a ſea-bird common on the coaſts of America, eſpecially about the banks of Newfoundland, and the iſlands about the Streights of Magellan. It has eight furrows on the beak, and white ſpots before the eye; is a very ſingular bird, and about the ſize of a gooſe.

PENINSULA, in geography, a portion or extent of land, joining to the continent by a narrow neck, or iſthmus; the reſt being encompaſſed with water.

PENIS, in anatomy, the primary organ of generation in man; being called alſo mentula, virgo, priapus, and by a multitude of other names.

PENITENCE, *Penitentia*, properly ſignifies the ſame with repentance; but is alſo uſed for the diſcipline, or puniſhment, more uſually called penance.

PENITENTS, an appellation given to certain fraternities of penitents, diſtinguiſhed by the different ſhape and colour of their habit.

PENNON, or Penon, a kind of ſtandard, with a long tail, anciently belonging to a ſimple gentleman. It is oppoſed to the banner, which was ſquare.

PENNY, an ancient ſilver coin, which, though now little uſed, was the only one current among our Saxon anceſtors. See Coin.

Penny-Earth, in agriculture, denotes a hard loamy, or ſandy earth, with a large portion of ſea-ſhells intermixed with it.

Penny-Royal, *Pulegium*, in botany, a plant having a perennial, creeping, fibrous root, with ſquare ſtalks, ſome of which grow upright, and others creep on the ground, putting out roots at every joint, whereby it ſpreads and propagates very faſt; the leaves are oval, and come out from the joints of the ſtalks in pairs, oppoſite; their ſmell is agreeable, but ſtrong, and the taſte is hot: the flowers proceed from juſt above the leaves at each joint, and are diſpoſed in whorles; they are of a pale purple, ſmall, and helmet-ſhaped on the upper lip, but cut into three unequal ſegments on the lower one; they are ſucceeded by four ſmall ſeeds, placed in the bottom of the cup. It flowers in July and Auguſt, at which time it ſhould be gathered for uſe.

This plant is of a very ſubtile and penetrating nature, and is therefore aperitive, diſcutient, and carminative, it is an excellent pectoral, and given with great ſucceſs in aſthmas, and all difficulties of breathing; ſome likewiſe recommend its application outwardly, in pains of the head; a diſtilled water of this plant, and alſo an oil, is kept in the ſhops for medicinal uſes.

Penny-weight, a troy-weight, containing 24 grains, each of which is equal in weight to a grain of wheat, gathered out of the middle of the ear, and well dried. See Weight.

PENSION, a ſum of money paid annually for ſervices or conſiderations already paſt.

PENSIONARY, or Pensioner, a perſon who has an appointment, or yearly ſum, payable during life, by way of acknowledgment, charged on the eſtate of a prince, company, or particular perſon.

Grand Pensionary, an appellation given to the firſt miniſter of the ſtates of Holland.

Pensionary, is alſo the firſt miniſter of the regency of each city in Holland.

PENSIONER, in general, denotes a perſon who receives a penſion, yearly ſalary, or allowance.

PENTSTOCK, a ſluice, or flood-gate, ſerving to retain or let go, at pleaſure, the water of a mill-pond, or the like. See Sluice.

PENTACHORD, an ancient muſical inſtrument, with five ſtrings, whence the name. The ſtrings were of bullocks leather, and ſtruck with a plectrum made of goats-horn.

PENTACROSTICK, in poetry, a ſet of verſes ſo diſpoſed as that there are always five acroſticks of the ſame name, in five diviſions of each verſe. See the article ACROSTICK.

PENTAGON, in geometry, a figure of five ſides and five angles. In fortification, pentagon denotes a fort with five baſtions.

PENTRAGRAPH, or PARALLELOGRAM, an inſtrument whereby deſigns of any kind may be copied in what proportion you pleaſe, without being ſkilled in drawing.

PENTAMETER, in ancient poetry, a kind of verſe conſiſting of five feet, or metres; whence the name. The two firſt feet may be either dactyls or ſpondees, at pleaſure; the third is always a ſpondee, and the two laſt anapeſts.

PENTANDRIA, the name of the fifth claſs in the Linnæan ſyſtem of botany; it comprehends all thoſe plants whoſe flowers are hermaphrodite; each containing five ſtamina, or male parts of generation. To this claſs belong the vine, gooſeberry, currant, primroſe, borage, nightſhade, flax, with many other genera.

PENTAPETALOUS, an appellation given to flowers that conſiſt of five petals or leaves.

PENTAPETES, in botany, a genus of plants, whoſe flower hath five oblong patent petals, and fifteen linear ſtamina, joined in a tube at their baſe, five of which are larger, coloured, and caſtrated; the antheræ of the others are oblong and erect: the fruit is an ovate ligneous capſule, with five cells, containing a number of oblong compreſſed ſeeds.

There is but one known ſpecies belonging to this genus, which is a native of India; the flowers are of a fine ſcarlet, and with us they blow from July to September, in ſucceſſion: the whole plant is annual, and raiſed from ſeeds on a hot-bed in the ſpring.

PENTASTICH, in poetry, a ſtanza, or diviſion of a poem, conſiſting of five verſes; whence the name.

PENTASTYLE, in architecture, a building wherein there are five rows of columns. See COLUMN.

PENTATEUCH, an appellation given to the firſt five books of the Old Teſtament, viz. Geneſis, Exodus, Leviticus, Numbers, Deuteronomy.

PENTECOST, a ſolemn feſtival of the Jews, ſo called becauſe it was celebrated on the 50th day after the 16th of the month Niſan, which was the ſecond day of the paſſover. The feaſt of Pentecoſt was inſtituted in memory of the law's being given on the 50th day after the Iſraelites came out of Egypt. It was on the feaſt of Pentecoſt that the Holy Ghoſt miraculouſly deſcended on the apoſtles. See WHITSUNDAY.

PENTHEMIMERIS, in ancient poetry, a part of a verſe conſiſting of two feet and a long ſyllable.

PENULTIMA, or PENULTIMATE SYLLABLE, in grammar, denotes the laſt ſyllable but one of a word; and hence the ante-penultimate ſyllable is the laſt but two, or that immediately before the penultima.

PENUMBRA, in aſtronomy, a partial ſhade obſerved between the perfect ſhadow and the full light in an eclipſe. It ariſes from the magnitude of the ſun's body; for were he only a luminous point, the ſhadow would be all perfect: but by reaſon of the diameter of the ſun, it happens that a place which is not illuminated by the whole body of the ſun, does yet receive rays from a part thereof. See ECLIPSE.

PEONY, in botany. See PÆONIA.

PEPASMUS, in medicine, denotes the digeſting and concocting of morbid humours.

PEPASTICK, or PEPTICK, in phyſick, are medicaments of the conſiſtence of an emplaiſter, for bringing humours to a head, and diſpoſing them to maturation.

PEPO, the POMPION, in botany, is comprehended by Linnæus among the cucurbita. See CUCURBITA.

PEPPER, *Piper*, in botany, a ſhrub, whoſe root is ſmall, fibrous, tough, and blackiſh, from which ariſe many ſhoots that are tough, flexible, green, and woody, lying on the ground, unleſs propped up; they have ſeveral knots or joints, at each of which the leaves are alternately diſpoſed; theſe are of a roundiſh form, two or three inches broad, and four long, terminating in points; the texture is thick and firm, and on the upper part they are of a ſhining duſky green, but beneath of a light green, and have ſhort thick pedicles: the flowers grow in ſpikes, cloſely covered, with very ſmall apetalous flowers without filaments; the antheræ are two in number, of a roundiſh form, and oppoſite to the root of the germen, which is large and oval, and crowned with a triple prickly ſtigma: the fruit is a roundiſh unilocular berry, containing one globoſe ſeed, which is green at firſt, and red when ripe, but in drying they grow black and wrinkled. It comes from Malabar, Java, Sumatra, and other parts of the E. Indies. This kind of pepper is of common and general uſe, and is every where employed as a ſpice to create an appetite, and help digeſtion.

Another ſort of pepper, called long pepper, is an upright dried fruit, about an inch, or an inch and a half long; it is oblong, round, cylindraceous, and, as it were, ſtreaked with ſpiral lines, with tubercles placed in the form of a net; within it is divided into ſeveral ſmall cells, containing each a ſmall round ſeed, blackiſh without, but whitiſh within, with an acrid, hot, bitteriſh taſte: long pepper is commonly pickled, and is in high eſteem among ſome. It is very good for cold phlegmatick conſtitutions.

When the rind of black pepper is taken off, it appears white, and is the only ſort brought to us by the name of white pepper, though ſome botanical authors give us an account of a ſpecies, whoſe fruit is naturally white; however, there is ſaid to be no difference between the plants that produce them, except in the colour of the fruit: it is now very rare, and only to be found in certain places of Malabar and Malacca. They have all much the ſame virtues, for they heat, dry, attenuate, reſolve, open and ſtrengthen relaxed fibres of the viſcera, and by exciting an oſcillation therein, refreſh the ſpirits, divide groſs humours, and increaſe the circulation of the blood. In the E. Indies they have a way of preſerving the common and long pepper in vinegar, and eating them afterwards at meals.

Jamaica PEPPER, *Pimenta*, in botany. See PIMENTA.

PEPPER-MINT, in botany. See MINT.

PERAMBULATOR, in ſurveying, an inſtrument for meaſuring diſtances, called alſo pedometer, waywiſer, and ſurveying-wheel.

It conſiſts of a wheel, A A, (*plate* LXII. *fig*. 6.) two feet ſeven inches and a half in diameter; conſequently, half a pole, or eight feet three inches in circumference. On one end of the axis is a nut, three quarters of an inch in diameter, and divided into eight teeth; which, upon moving the wheel round, fall into the teeth of another nut O (*fig*. 7.) fixed on one end of an iron rod Q, and this turns the rod once round, in the time the wheel makes one revolution. This rod, lying along a groove in the ſide of the carriage of the inſtrument, has at its other end a ſquare hole, into which is fitted the end *b* of a ſmall cylinder P. This cylinder is diſpoſed under the dial-plate of a movement, at the end of the carriage B, (*fig*. 6.) in ſuch a manner as to be moveable about its axis; its end *a* is cut into a perpetual ſcrew, which falling into the 32 teeth of a wheel perpendicular thereto, upon driving the inſtrument forward, that wheel makes a revolution each 16th pole. On the axis of this wheel is a pinion with 6 teeth, which, falling into the teeth of another wheel of 60 teeth, carries it round every 160th pole, or half a mile.

This laſt wheel, carrying a hand or index round with it over the diviſions of a dial-plate, whoſe outer limb is divided into 160 parts, correſponding to the 160 poles, points out the number of poles paſſed over. Again, on the axis of this laſt wheel is a pinion, containing 20 teeth, which, falling into the teeth of a third wheel, which hath 40 teeth, drives it once round in 320 poles, or a mile. On the axis of this wheel is a pinion of 12 teeth, which, falling into the teeth of the fourth wheel, having 72 teeth, drives it once round in 12 miles.

This fourth wheel, carrying another index over the inner limb of the dial-plate, divided into 12 for miles, and each mile ſubdivided into halves, quarters, and furlongs, ſerves to regiſter the revolutions of the other hand, and to keep account of the half miles and miles paſſed over as far as 12 miles.

The uſe of this inſtrument is obvious from its conſtruction. Its proper office is in the ſurveying of roads and large diſtances, where a great deal of expedition, and not much accuracy, is required. It is evident, that driving it along, and obſerving the hands, has the ſame

effect as dragging the chain, and taking account of the chains and links.

Its advantages are its handinefs and expedition; its contrivance is fuch, that it may be fitted to the wheel of a coach, in which ftate it performs its office, and meafures the road without any trouble at all.

PER ARSIN ET THESIN, in mufick; the former denotes when a fong, counter-point, fugue, &c. afcend in the notes from grave to acute; and per thefin, when the notes defcend from acute to grave.

PERCEPTION, *Perceptio*, in philofophy, the act of apprehending a thing, or that fimple idea which we conceive of a thing, without making any affirmation or negation. If that idea exhibit any image to the mind, it is called imagination. The faculty of perception conftitutes what we call the underftanding.

It may be obferved, that the ideas we receive by perception, are often altered by the judgment, without our taking any notice of it, fo that we take that for the perception of our fenfes, which is but an idea formed by the judgment. The faculty of perception feems to be that which puts the diftinction between the animate and inanimate parts of the creation.

PERCH, POLE, or ROD, *Pertica, Catena, Funis, Decempeda*, a long meafure much ufed in furveying and meafuring of land, being 10 feet long.

Our ftatute perch contains 16 feet and a half; and for coppice-woods, &c. 18 feet. Forty fquare perches make a rood, and 160 an acre.

The perch, in Staffordfhire, is 24 feet. In the foreft of Sherwood 21, the foot there being 18 inches. In Herefordfhire, a perch of walling is 16 feet and a half; a perch of ditching 21 feet, &c. In France, the perch is from 18 to 27 of their feet.

PERCHANT, among fowlers, a decoy-bird which is faftened by the foot, and flutters about the place to draw other birds to it.

PERCUSSION, in phyficks, the impreffion a body makes in falling or ftriking upon another, or the fhock of two moving bodies; and it is either direct or oblique.

Direct PERCUSSION, is where the impulfe is given in the direction of a right line perpendicular to the point of contact.

Oblique PERCUSSION, when it is given in the direction of a line oblique to the point of contact. For the nature of percuffion in bodies elaftick and non-elaftick, fee MOTION.

Centre of PERCUSSION, that point wherein the fhock of the percutient bodies is the greateft; being the fame with the centre of ofcillation, if the percutient body revolve round a fixed axis. If the motion be parallel and with the fame velocity, the centre of percuffion is the fame with the centre of gravity.

PERDUE, in war, denotes the forlorn hope; and to lie perdue, is to lie flat and clofely in wait.

PEREMPTORY, in law, denotes whatever is abfolute and final, not to be altered, renewed, or reftrained.

PERENNIAL, in botany, is applied to fuch plants whofe roots will endure many years. There are two kinds of perennials; the one retain their leaves all winter, called evergreens; the other caft them, called deciduous or perdefols.

PERFECT, denotes that which wants nothing requifite to its nature and kind.

PERFECT, in arithmetick, is applied to fuch a number, all whofe aliquot parts, added together, make the fame number with that whereof they are fuch parts, as 6, 28, &c.

PERFECT, in grammar, a preter or preter-perfect tenfe, is an inflection marking a time perfectly paft, as, I have feen; plufquam perfect expreffes a time more than perfectly paft, as, I had feen.

PERFECT, in mufick, denotes fomething that fatisfies the mind and ear. The word perfect, when joined with mode and time, ufually expreffes, among the ancients, triple time or meafure, in oppofition to double time, which they called imperfect.

PERFECTION, the ftate or quality of a thing perfect; which is of divers kinds, phyfical, moral, and metaphyfical.

Phyfical or natural PERFECTION, is that whereby a thing has all its powers, and thofe in their full vigour.

2

Moral PERFECTION, an eminent degree of virtue or moral goodnefs.

PERFIDIA, in mufick, denotes an affectation of doing always the fame thing, continuing the fame motion, and the fame figures of notes.

PERFUME, an agreeable artificial odour ftriking the organ of fmelling, that confifts of odoriferous herbs and aromaticks.

PERFUMES, *Suffitus*, in pharmacy, &c. are topical medicines compofed of certain powders and gums, which, when thrown on the coals, produce a fmoke falutary in feveral difeafes.

PERIANTHIUM, *Perianthæum*, empalement or calyx, in botany, the little green leaves that compafs the bottom of flowers. It ferves as a fupport and fecurity to the other parts of the flower.

PERIAPTON, *Periamma*, the fame with amulet, which, when tied about the neck, is fuppofed to prevent or cure difeafes.

PERICARDIARY, is applied to worms generated in the pericardium or capfule of the heart; which M. Andry makes one of the 12 kinds produced in the human body.

PERICARDIUM, in anatomy, a membranous capfula that includes the heart. See HEART.

PERICARPIA, *Epicarpia*, in phyfick, any topical medicines applied to the carpus or wrift.

PERICARPIUM, *Pericarpus*, in botany, any membrane, hufk, &c. that furrounds the fruit of vegetables.

PERICHORUS, in antiquity, denoted fuch obfcure games among the Greeks, as were not confecrated to any of the gods.

PERICRANIUM, in anatomy, a thick membrane that covers the outfide of the fkull. See CRANIUM.

PERIDROME, *Peridromus*, in the ancient architecture, the fpace or ifle in a periptere between the columns and the wall, which, according to Salmafius, ferved among the Greeks for walking.

PERIGÆUM, or PERIGEE, in aftronomy, that point in the fun's or moon's orbit, wherein they are at their leaft diftance from the earth; and fo ftands oppofed to apogee.

PERIGEE, in the ancient aftronomy, a point in a planet's orbit, wherein the centre of its epicycle is at the leaft diftance from the earth.

PERIHELIUM, in aftronomy, that point of the orbit of a planet or comet, wherein it is at its leaft diftance from the fun. It ftands oppofed to aphelium; the ancient aftronomers ufed perigæum inftead of it, as placing the earth in the centre.

PERIMETER, in geometry, the extent that bounds any figure or body. The perimeters of figures or furfaces are lines; thofe of bodies are furfaces. In circular figures, &c. we ufe circumference or periphery inftead of perimeter.

PERINÆUM, *Perineum*, in anatomy, the fpace betwixt the anus and parts of generation, divided into two equal lateral parts, by a very diftinct line, which is longer in males than females. This part is fubject to laceration in difficult births, and in this part the puncture of the perinæum is performed.

PERINDE VALERE, in the canon law, a difpenfation granted a clerk, who being legally incapable of a benefice, &c. is, de facto, admitted thereby to it.

PERIOCHA, an argument indicating the fum of a difcourfe.

PERIOD, *Periodus*, in aftronomy, the time a ftar or planet takes in making a revolution, or the duration of its courfe till it return to the fame point of the heavens.

The earth's period is 365 days, 5 hours, 49 minutes; that of the moon 27 days, 7 hours, 43 minutes.

There is a wonderful harmony between the diftances of the planets from the fun and the periods round him, the fquares of the periodick times being ever proportional to the cubes of their mean diftances from the fun.

PERIOD, in chronology, an epocha or interval of time by which the years are accounted in different nations and on different occafions.

The Calippick PERIOD, a feries of 76 years returning in a perpetual circle; which, when elapfed, the new and full moons are fuppofed to return to the fame day of the folar year: it is an improvement on the Metonick of 19 years, which proving inaccurate, Calippus, the Athenian, multiplied it by 4.

Hipparchus's

Hipparchus's Period, a feries of 304 folar years periodically returning and reftoring the new and full moons to the fame day of the folar year, according to Hipparchus; which period arifes by multiplying the Calippick period by 4. Hipparchus affumed the quantity of the folar year to be $365^d\ 5^h\ 55'\ 12''$: and hence concluded, that in 104 years, Calippus's period would err a whole day; he therefore multiplied the period by 4, and, from the product, caft away a whole day; but, notwithftanding this, the new and full moons are fometimes anticipated $1^d\ 8^h\ 23'\ 29''\ 20'''$.

Julian Period, a feries of 7980 Julian years, arifing by the multiplication of the cycles of the moon, fun, and indictions into one another.

Metonick Period. See Cycle *of the Moon*.

Victorian Period, an interval of 532 Julian years, which, when elapfed, the new and full moons return to the fame day, according to Victorinus or Victorius, who lived in the time of pope Hilary. Some afcribe it to Dionyfius Exiguus, and give it his name.

It is produced by multiplying the lunar cycle 19 by the folar cycle 18. But neither does this reftore the new and full moons to the fame day by $1^d\ 19^h\ 58'\ 59''\ 40'''$.

Period, in grammar, a little compafs of difcourfe, containing a perfect fentence or fenfe, diftinguifhed at the end by a full ftop (.) and its feveral members marked by commas, colons, &c.

Period, in numbers, a diftinction made by a point or comma after every fixth place, and is ufed in numeration, the more readily to diftinguifh the feveral figures.

Period, *Periodus*, in medicine, the time between the accefs of one fit or paroxyfm and that of the next, including the entire exacerbation, decline, and intermiffion or remiffion. Thefe are frequently very regular in fevers; but, in chronical diforders, more irregular. Hence fuch difeafes are called periodical.

PERIODICK, or Periodical, fomething that terminates in or comprizes a period.

Periodical *Month*, the fpace of time in which the moon returns to the fame point of the zodiack, wherein fhe was, when fhe left the fun.

Periodical *Difeafes*; fee Period, in medicine.

Periodick, in grammar, is applied to a ftyle that confifts of juft and artful periods.

PERIOECI, in geography, fuch inhabitants of the globe as have the fame latitudes, but oppofite longitudes; or live under the fame parallel and the fame meridian, but in different femi-circles of that meridian, or oppofite points of the parallel. Thefe have the fame common feafons throughout the year, and the fame phænomena of the heavenly bodies, but their hours are oppofite; for with the one, when it is mid-day, with the other it is mid-night.

PERIOPHTHALMIUM, in natural hiftory, a thin fkin which birds can draw over their eyes, to defend them without fhutting their eye-lids: it is the fame with the nictitating membrane.

PERIOSTEUM, *Perioftium*, in anatomy, the fine fenfible membrane that invelopes the bones. See Bone.

PERIPATETICK *Philofophy*, the fyftem taught by Ariftotle, and maintained by his followers the Peripateticks.

PERIPATETICKS, *Peripatetici*, *Ariftotelians*, a fect of philofophers, the followers of Ariftotle, or maintainers of the peripatetick philofophy. The greateft and beft part of Ariftotle's philofophy he borrowed from his mafter Plato.

Ariftotle's philofophy preferved itfelf in puris naturalibus a long time, till the beginning of the XIIIth century, when it began to be new modelled. A reformed fyftem of Peripateticifm was firft introduced into the fchools in the univerfity of Paris; from whence it foon fpread throughout Europe, and has fubfifted to this day under the name of fchool philofophy, and the retainers thereto may be denominated reformed Peripateticks. Out of thefe have fprung at feveral times, the Thomifts, Scotifts, and Nominalifts.

PERIPETIA, in the drama, coincides with the cataftrophe or unravelling; being properly the change of condition, whether happy or unhappy, which the principal perfons undergo, arifing from fome difcovery or incident which gives a new turn to the action.

The qualities of the peripetia are, that it be probable and neceffary; in order to which, it muft be the natural refult, at leaft the effect of the foregoing actions, or fubject itfelf.

Sometimes the peripetia is occafioned without any difcovery, as in the Antigone of Sophocles, where the change in Creon's fortune is produced by the effect of his own obftinacy; and fometimes by a mere change of the will, which, though the leaft artful, yet Mr. Dryden obferves, may be fo managed as to become exceedingly beautiful.

Thefe two cafes Ariftotle calls fimple peripetias, the change in thefe confifting in a paffage out of trouble and action into tranquillity and reft.

PERIPHERY, in geometry, the circumference of a circle ellipfis, parabola, &c.

Geometricians demonftrate, that a circle is equal to a triangle, whofe bafe is equal to the periphery, and altitude to the radius: hence it follows, that circles are in a ratio compounded of their peripheries and radii: but they are alfo in the duplicate ratio of their radii; therefore, the peripheries of circles are to each other as their radii: and fince the periphery of one circle is to its radius, as the periphery of any other to its radius; the ratio of the periphery to the diameter is the fame in all circles, which is ufually taken to be as 314 to 100 nearly.

PERIPHRASIS, *Circumlocutio*, in rhetorick, a circuit of words much ufed by orators to avoid trite manners of expreffion. We are frequently forced to have recourfe to it, to make things be conceived, which it is not proper to name; it being polite to fupprefs the names, and only intimate or defign them. That no direct citations may be made, there muft be a compafs taken to infinuate the authors, whofe authority we borrow.

PERIPNEUMONY, in medicine, an inflammation of the lungs, attended with a weight in the lungs, a difficulty of breathing, and an oppreffion of the breaft, with a purulent fpitting, and a fever accompanied with a cough. When the inflammation affects both the lobes, and the whole body of the lungs, the cafe is defperate.

PERIPTERE, in the ancient architecture, a building encompaffed on the outfide with a feries of infulated columns, forming a kind of portico all around; fuch were the portico of Pompey, the feptizon of Severus, and the bafilica of Antoninus. The peripteres were properly temples, which had columns on all the four fides, by which they were diftinguifhed from the proftyle and amphiproftyle, the laft of which had no columns before, and the firft none on the fides.

M. Perault obferves, that periptere, in the general fenfe of the word, is the name of a genus, including all the fpecies of temples, which have porticos of columns all around, whether the columns be diptere, or pfeudodiptere, or fimply periptere, which is a fpecies that bears the name of a genus, and which has its columns diftant from the wall, the breadth of an intercolumnation.

PERISCII, in geography, the inhabitants of either frigid zone, between the polar circles and the poles; where the fun, when in the fummer figns, moves only round about them, without fetting, and confequently their fhadows, in the fame day, turn to all the points of the horizon.

PERISKYTISM, in ancient furgery, an incifion made under the coronal future, reaching from one temple acrofs to the other, penetrating to the bone of the cranium.

PERISTALTICK, in medicine, a vermicular fpontaneous motion of the inteftines, performed by the contraction of the fingular and longitudinal fibres, of which the flefhy coats of the inteftines are compofed; by means whereof the chyle is driven into the orifices of the lacteal veins, and the fæces are protruded towards the anus.

When this motion comes to be depraved, and its direction changed, fo as to proceed from below upwards, it produces what is called the iliack paffion. See Iliack Passion.

PERISTAPHYLINUS, in anatomy, a name which fome give to a mufcle of the uvula, more properly denominated pterygoftaphylinus. See the article Pterygostaphylinus.

PERISTYLE, in ancient architecture, a building encompaffed with a row of columns on the infide: fuch was the hypæthre temple of Vitruvius, and fuch are now fome bafilicas in Rome, feveral palaces in Italy, and moft cloifters of religious.

Peristyle is alfo ufed by modern writers for a range

of

of columns, either within or without a building; thus we say, the Corinthian peristyle of the portal of the Louvre, &c.

PERISYSTOLE, in medicine, the interval of rest between the two motions of the heart, viz. that of the systole, or contraction, and that of the diastole, or dilatation.

PERITONÆUM, in anatomy, is a thin, smooth, and lubricous membrane, investing the whole internal surface of the abdomen, and containing most of the viscera of that part, as it were in a bag.

PERITROCHIUM, in mechanicks, denotes a wheel, or circle, concentrick with the base of a cylinder, and moveable with it about an axis. See AXIS *in Peritrochio*.

PERJURY, in law, the crime of swearing falsely, where a lawful oath is administered by one in authority, in a matter relating to the issue or cause in question, whether it be a person's own wilful act, or done by the subornation of others.

In order to make an offence perjury, it must appear to be wilful and deliberate, and not done through surprize or inadvertency: it must be direct and positive, and not where a person swears as he thinks or believes: but in case a person swears to what he is ignorant of, it is a false oath, even though what he swears should happen to be true; thus, a plaintiff caused two persons to swear to the value of goods which they never saw, when, notwithstanding they swore what was true, it was adjudged to be perjury in them. At the common law, perjury, and the subornation of it, are punishable by fine, imprisonment, pillory, transportation, &c.

PERMANENT, in general, something that continues the same, whether in nature or situation, and other circumstances: thus air, generated by fermentation, is said to be permanent, because it continues to shew all the natural properties of common air.

Thus also those cups of flowers are called permanent, which remain after the flower-leaves are fallen.

PERMEABLE, a term applied to bodies of so loose and porous a structure, as to let something pass through them.

PERMUTATION, in commerce, the same with bartering. See BARTERING.

In the canon law, permutation denotes the actual change of one benefice for another.

PERMUTATION *of Quantities*, in algebra, the same with combination.

PERNANCY, in law, signifying taking or receiving, is peculiarly applied to tithes taken in kind.

PERONIO, a chilblain. See CHILBLAIN.

PERORATION, *Peroratio*, in rhetorick, the epilogue or last part of an action, wherein the orator urges what he had said with more vehemence. It consists of two parts, a recapitulation, and a moving of the passions. The passions to be raised in the peroration are various, according to the various kinds of orations. The qualities required in the peroration are, that it be vehement and short.

The peroration was Cicero's master-piece; here that great orator not only set his judges and auditors on fire, but even seemed to burn himself, especially when he was to raise commiseration towards the accused, where, as he himself tells us, he frequently filled the forum with weeping and lamentation. He adds that, when there were several orators to speak for the same person, the peroration was reserved to Cicero; and he subjoins that, if he excelled therein, it was not owing to genius, but the grief he himself shewed.

PERPENDICULAR, in geometry, a line falling directly on another line, so as to make equal angles on each side, called also a normal line. Thus the line I G (*plate* LXIV. *fig*. 6.) is perpendicular to the line K H, and makes right and equal angles therewith.

To erect a PERPENDICULAR *on a given Line*, as A B from any assigned point as B (*fig*. 7.) Upon any point (taken at an adventure) out of the given line, as at C describe such a circle as will pass through the point from whence the perpendicular must be raised, as at B (viz. make C B radius;) and, from the point where the circle cuts the given line as at A, draw the circle's diameter A C D. Then from the point D draw the right line D B, and it will be the perpendicular, as was required.

To let fall a PERPENDICULAR on a given line, as A B (*fig*. 8.) from any assigned point, as C. Upon the given point C describe such an arch of a circle as will cross the given line A B in two points as at *d* and *f*; then bissect the distance between those two points *d*, *f*, as at *x*. Draw the right line C *x*, and it will be the perpendicular required.

PERPENDICULAR *to a Parabola*, is a right line cutting the parabola in the point in which any other right line touches it, and is also itself perpendicular to that tangent.

PERPENDICULARITY *of Plants*, a curious phænomenon in natural history, first observed by M. Dodart, and published in an express essay on the affectation of perpendicularity observable in the stems of all plants, the roots of many, and even in the branches as much as possible.

M. Dodart supposes that the fibres of the stalks are of such a nature, as that they contract by the heat of the sun, and lengthen out by the moisture of the earth; and the contrary happens in the fibres of the roots. When then the plantule is inverted and the root a-top, the fibres which compose one of the branches of the root, are not equally exposed to the moisture of the earth, and the lower part is more exposed than the upper; the lower therefore must contract the most, which contraction is again promoted by the lengthening of the upper, whereon the sun acts with the greatest force. Consequently, this branch of the root must recoil towards the earth, and, insinuating through its pores, get underneath the bulb, &c. In a word, the earth attracts the root to itself, and the sun contributes to its descent; and, on the contrary, the sun attracts the stem, and the earth in some measure sends it towards the same.

As to the straightening of the stalks in the open air, he takes it to arise from the impression of external causes, particularly the sun and rain. Now both these causes in a certain structure of the fibres tend equally to straighten the part most exposed; but what that structure is, or whereon it depends, is still a mystery.

M. de la Hire accounts for the perpendicularity thus: he imagines that the root draws a coarser juice, and the stem and its branches a finer and more volatile one. This difference of juices supposes larger pores in the roots than the stalk, &c. and a different contexture: in the little invisible plant inclosed in the seed we may conceive a point of separation, such as that all on one side shall be unfolded by the grosser juices, and all on the other by the more subtile.

Suppose the plantule, when its parts begin to unfold, to be entirely inverted; the juices which enter the root will still be coarsest, and, when they have opened the pores so as to admit juices of a determinate weight, those juices, still pressing the root, will drive it downwards, and this the more, as the root is more enlarged; for the point of separation being conceived as the fixed point of a lever, they will act by the longer arm. At the same time the volatile juices having penetrated the stalk, will tend to give it a direction from below upwards; and thus is the little plant turned on its fixed point of separation till it be perfectly erect.

The plant thus erected, the stalk, we know, should continue to rise perpendicularly; for which M. Parent accounts thus: the nutritious juice being arrived at the extremity of a rising stalk, if it evaporate, the weight of the air will make it ascend vertically; and, if it congeal there, the weight of the air will give it the same direction; the new drops of juice that succeed will follow the same direction; and as all together form the stalk, that must of course be vertical, unless some particular circumstance intervene.

As to the branches, though they should even come out horizontally, yet they must raise themselves upwards by the constant direction of the nutritious juice; hence may be accounted the regular direction of the branches, which all, and always, nearly make the same angle of 45° with the stem and one another.

M. Astruc accounts for the perpendicularity on these two principles: 1. That the nutritious juice arises from the circumference, and terminates in the pith. 2. That fluids contained in tubes, either parallel or oblique to the horizon, granulate on the lower part of the tubes, and not at all on the upper.

PERPETUAL, something that always endures, or lasts for ever.

Perpetual *Motion*, in mechanicks, a motion which is supplied from itself, without the intervention of any external cause.

This famous problem has given rise to an infinite number of schemes, which have all proved equally abortive. What has given rise to the belief of a perpetual motion is the following mechanical principle.

The momentums of the weight and power are as the quantities of matter in each multiplied by their respective celerities, and the celerities are as the distances from the centre of motion, and also as the spaces passed through in a perpendicular direction in the same time; it must follow that there will be an equilibium between the weights, when they are to each other reciprocally as the distances from the centre, or as the celerities of the motions, or as the perpendicular ascent or descent in the same time; and this universally in all mechanical powers whatever, which is therefore the fundamental principle of all mechanicks. The nature of this proposition, not being understood by smatterers in mechanicks, gave them occasion to imagine the possibility of a perpetual motion from one part of it, which they did not see was utterly impossible from another part of it.

PERPETUITY, in law, is when an estate is intended to be so settled in tail, &c. that it may not possibly be undone or made void.

PERQUISITE, in law, is any thing gotten by a man's own industry, or purchased with his money; in contradistinction to what descends to him, from his father or other ancestors.

Perquisites *of Courts*, are the profits which casually accrue to the lord of the manor from his courts-baron, by fines for copyholds, escheats, heriots, amercements, &c.

PERRON, in architecture, the steps in the front of a building, raised before the doors of great houses, and leading to the first story, when raised above the level of the ground.

PERRY, a drink made of pears in the same manner as cyder is made from apples. See Cyder.

PERSEA, Avocado-pear, in botany, an evergreen tree, which grows to the height of 30 feet, and upwards; the trunk is large, smooth, and of an ash colour; the branches are furnished with large, oblong, smooth leaves, like those of laurel, and of a deep green colour; the flowers are produced towards the extremities of the branches, and are hexapetalous, acuminated, and spread open: the fruit is fleshy and pyramidical (about the size of one of our largest pears) inclosing a large oval seed, with two lobes, included in a thin shell.

This tree grows in great plenty in the W. Indies, and is esteemed by its inhabitants not only as a desert, but as very necessary for the support of life: the fruit alone is very insipid, for which reason they generally eat it with the juice of lemons and sugar, to give it a pungency; it is very nourishing, and is reckoned a great incentive to venery: it is eaten by some people with vinegar and pepper. This plant is comprehended by Linnæus among the laurus: it is raised from seed, and requires a hot-house in this climate to preserve it.

PERSECUTION, is any pain or affliction which a person designedly inflicts upon another; and, in a more restrained sense, the sufferings of Christians on account of their religion.

PERSEVERANCE, in theology, a Christian virtue, by which we are enabled to persist in the way of salvation to the end.

PERSEUS, in astronomy, a constellation of the northern hemisphere, which, according to the catalogues of Ptolemy and Tycho, contains 29 stars; but in the Britannick catalogue, 67.

PERSIAN-Wheel, an engine, or wheel, turned by a rivulet, or other stream of water, and fitted with open boxes at its cogs, to raise water for the overflowing of lands, or other purposes.

It may be made of any size, according to the height the water is to be raised to, and the strength of the stream by which it is turned. This wheel is placed so, that its bottom only is immersed in the water, wherein the open boxes at its cogs are all filled, one after another, with water, which is raised with them to the upper part of the wheel's circuit, and then naturally empties itself into a trough which carries it to the land.

PERSICA, the peach, in botany. See Peach.

PERSICARIA, arsmart, in botany, a genus of plants, whose flower in monopetalous, and cut into five spreading segments; there is no pericarpium, but the seed, which is single, roundish, and acute-pointed, is contained in the corolla, which is permanent. There is great irregularity in this genus, some species having only five stamina, and others six or eight, and one, two, or three styles.

The spotted arsmart sends forth stalks to the height of a foot; they are hollow, redish, branched and jointed; the leaves are shaped like those of the peach-tree, and marked with black spots; the flowers grow in spikes, and come out in July and August. It grows wild in watery, marshy, and moist ditches, almost every where.

Another species, called by some water-pepper, and biting arsmart, grows in moist places; it is extremely hot and penetrating, insomuch that the taste is hardly tolerable; this has made it obtain in scorbutick cases, hypochondriack affections, and all disorders arising from a sluggish circulation of the fluids; and its distilled water, given in two or three ounces, is accounted a specifick against the gravel and stone: all authors agree, that the herb applied to old ulcers eats away proud flesh, cleanses and dries them; applied as a cataplasm to the bruises of horses, it desolves the coagulated blood; and if wounds or ulcers are washed with the juice, the flies will never come near them.

PERSON, an individual substance of a rational or intelligent nature. Thus we say, an embassador represents the person of his prince; and that in law, the father and the son are reputed the same person.

Person, in dramatick poetry, the character assumed by an actor, or he who is represented by the player. Thus, at the head of dramatick pieces, are placed the dramatis personæ, or list of the persons that are to appear on the stage. Father Bossu observes, that in the epick and dramatick poem the same person must reign throughout; that is, must sustain the chief part through the whole piece, and the characters of all the other persons must be subordinate to him.

Person, in grammar, a term applied to such nouns or pronouns, as being either prefixed or understood, are the nominatives in all inflections of a verb; or it is the agent or patient in all finite and personal verbs.

PERSONABLE, in law, signifies the being able to maintain a plea in court; especially in the case of an alien, who may be made personable by act of parliament.

It is also used to signify a capacity to receive any thing granted or given.

PERSONAL, any thing that concerns, or is restrained to, the person: thus it is a maxim in ethicks, that all faults are personal.

Personal *Action*, in law, is an action levied directly and solely against the person, in opposition to a real or mixed action.

Personal *Goods*, or *Chattels*, in law, signifies any moveable thing belonging to a person, whether alive or dead.

Personal *Tythes*, are tythes payable out of the profits obtained by a man's personal labour and industry, as in buying, selling, handicraft, &c.

Personal *Verb*, in grammar, a verb conjugated in all the three persons; thus called, in opposition to an impersonal verb, or that which has the third person only. See Impersonal *Verb*.

PERSONALITY, in the schools, that which constitutes an individual a distinct person.

PERSONATED Flowers, among botanists, are those which resemble the gaping mouths of certain living animals: they belong to the angiosperma order of the didynamia class, in botany: such are the snap-dragon, eye-bright, cow-wheat, rhinanthus, &c.

PERSPECTIVE, that branch of opticks, which teaches how to represent objects on a plane superficies, such as they would appear at a certain distance and height, upon a transparent plane perpendicular to the horizon, placed between the objects and the eye.

The following rules are of general use in the practice of perspective: 1. Let every line, which in the object, or geometrical figure, is straight, perpendicular, or parallel to its base, be so also in its scenographick delineation. 2. Let the lines, which in the object return at right

right angles from the fore-right ſide, be drawn ſcenographically from the viſual point. 3. Let all ſtraight lines, which in the object return from the fore-right ſide, run in a ſcenographick figure into the horizontal line. 4. Let the object you intend to delineate, ſtanding on your right hand, be placed alſo on the right hand of the viſual point; and that on the left hand, on the left hand of the ſame point; and that which is juſt before, in the middle of it. 5. Let theſe lines which are (in the object) equidiſtant to the returning line, be drawn in the ſcenographick figure, from that point found in the horizon. 6. In ſetting off the altitude of columns, pedeſtals, and the like, meaſure the height from the baſe line upward, in the front, or fore-right ſide; and a viſual ray down that point in the front ſhall limit the altitude of the column or pillar, all the way behind the fore-right ſide, or orthographick appearance, even to the viſual point. This rule you muſt obſerve in all figures, as well where there is a front or fore-right ſide, as where there is none. 7. In delineating ovals, circles, arches, croſſes, ſpirals, and croſs-arches, or any other figure in the roof of any room, firſt draw ichnographically, and ſo with perpendiculars from the moſt eminent points thereof, carry it up into the cieling; from which ſeveral points, carry on the figure. 8. The centre in any ſcenographick regular figure is found by drawing croſs lines from oppoſite angles: for the point where the diagonals croſs, is the centre. 9. A ground-plane of ſquares is alike, both above and below the horizontal line; only the more it is diſtant above or below the horizon, the ſquares will be ſo much the larger or wider. 10. In drawing a perſpective figure, where many lines come together, you may, for the directing of your eye, draw the diagonals in red; the viſual lines in black; the perpendiculars in green, or other different colour, from that which you intend the figure ſhall be of. 11. Having conſidered the height, diſtance, and poſition of the figure, and drawn it accordingly, with ſide or angle againſt the baſe; raiſe perpendiculars from the ſeveral angles, or deſigned points, from the figure to the baſe, and transfer the length of each perpendicular, from the place where it touches the baſe, to the baſe on the ſide oppoſite to the point of diſtance; ſo will the diametrals drawn to the perpendiculars in the baſe, by interſection with the diagonals, drawn to the ſeveral transferred diſtances, give the angles of the figures, and ſo lines drawn from point to point will circumſcribe the ſcenographick figure. 12. If in a landſkip there be any ſtanding waters, as rivers, ponds, and the like, place the horizontal line level with the fartheſt ſight or appearance of it. 13. If there be any houſe, or the like, in the picture, conſider their poſition, that you may find from what point in the horizontal lines to draw the front and ſides thereof. 14. In deſcribing things at great diſtance, obſerve the proportion, both in magnitude and diſtance, in draught, which appears from the object to the eye. 15. In colouring and ſhadowing of every thing, you muſt do the ſame in your picture, which you obſerve with your eye, eſpecially in objects lying near; but, according as the diſtance grows greater and greater, ſo the colours muſt be fainter and fainter, till at laſt they loſe themſelves in a darkiſh ſky-colour. 16. The catoptricks are beſt ſeen in a common looking-glaſs, or other poliſhed matter; where, if the glaſs be exactly flat, the object is exactly like its original; but, if the glaſs be not flat, the reſemblance alters from the original; and that more or leſs, according as the glaſs differs from an exact plane. 17. In drawing catoptrick figures, the ſurface of the glaſs is to be conſidered, upon which you mean to have the reflection: for which you muſt make a particular ichnographical draught, or projection; which on the glaſs muſt appear to be a plane full of ſquares, on which projection transfer what ſhall be drawn on a plane, divided into the ſame number of like ſquares; which though the draught may appear very confuſed, yet the reflection of it on the glaſs will be regular, proportional, and regularly compoſed. 18. The dioptrick, or broken beam, may be ſeen in a tube through a cryſtal or glaſs, which hath its ſurface cut into many others, whereby the rays of the object are broken. For to the flat of the cryſtal, or water, the rays run ſtraight; but then they break and make an angle, which alſo by the refracted beams is made and continued on the other ſide of the ſame flat. 19. When theſe faces on a cryſtal are returned towards a plane placed directly before it, they ſeparate themſelves at a good diſtance on the plane, becauſe they are all directed to various far diſtant places of the ſame.

Perspective alſo denotes a kind of painting frequently ſeen in gardens, at the end of galleries, &c. expreſſly deſigned to deceive the ſight.

Perspective-*Glaſs*, in opticks, differs from a teleſcope in this: inſtead of the convex eye-glaſs placed behind the image, to make the rays of each pencil go parallel to the eye, there is placed a concave eye-glaſs as much before it; which opens the converging rays, and makes them emerge parallel to the eye. The quantity of objects taken in at one view with this inſtrument, does not depend upon the breadth of the eye-glaſs, as in the aſtronomical teleſcope, but upon the breadth of the pupil of the eye.

Perspective *Plane*, is the glaſs, or other tranſparent ſurface ſuppoſed to be placed between the eye and the object, perpendicularly to the horizon. It is ſometimes called the ſection, table, or glaſs.

PERSPIRATION, in medicine, the evacuation of the juices of the body through the pores of the ſkin. Perſpiration is diſtinguiſhed into ſenſible and inſenſible: and here ſenſible perſpiration is the ſame with ſweating; and inſenſible perſpiration, that which eſcapes the notice of the ſenſes; and this laſt is the idea affixed to the word perſpiration when uſed alone.

PESADE, or Pesate, in the menage, is a horſe's raiſing his fore-quarters, and bending his feet up to his body without ſtirring his hind-feet.

PESSARY, *Peſſus*, *Talus*, in phyſick, a medicine introduced into the pudendum muliebre, of the length of the fore-finger. It was prepared by the ancients of wool, lint, or linen, mixed with powders, oils, wax, &c. and it was diſtinguiſhed into three kinds, emollient, aſtringent, and ſuch as open the orifices of the veins. Theſe were uſed in the cure of uterine diſorders. The moderns have too much neglected the uſe of peſſaries of this kind, but employ peſſaries of various figures and materials: they are principally ſerviceable in a prolapſus uteri, and incontinence of urine in females.

PESTILENCE, in medicine, an epidemical, malignant, and contagious diſeaſe, uſually mortal. See the article Plague.

PEST-House, a lazaretto, or infirmary, where goods, particularly perſons, &c. infected, or ſuppoſed to be infected with ſome contagious diſeaſe, are put and provided for.

PESTILENTIAL Fevers, in phyſick, are ſuch fevers as do not only afflict the patient with a vehement heat, but alſo with ſome malignant quality.

PETALA, in botany, are the flower-leaves of plants, to diſtinguiſh them from the leaves of the plants. The petala, which encompaſs the ſtamina and piſtil, are no other than covers to ſecure and ſcreen the generative parts, unleſs, as Mr. Bradley conjectures, they may alſo ſerve to ſecrete ſome fine juice for the nouriſhment of the ſeed.

PETALISM, *Petaliſmus*, in antiquity, a kind of baniſhment for five years, uſed at Syracuſe, by the people's writing the name of the perſon condemned upon a leaf, as the Oſtraciſm at Athens was for 10 years.

PETALODES; the urine is ſo denominated, when it is ſcaly, or reſembles leaves.

Petalodes, in botany, denotes ſuch plants as are furniſhed with flower-leaves, or petals; whereas thoſe which have none are called apetalous.

PETARD, in war, a kind of metal engine, ſomewhat like a high-crowned hat, narrow at the breech and wide at the muzzle, made of copper mixed with a little braſs, or of lead with tin, uſually about ſeven inches long, and five broad at the mouth, weighing from 40 to 50 pounds. Its charge is from five to ſix pounds of powder, which reaches to within three fingers of the mouth; the vacancy is filled with tow, and ſtopped with a wooden tampion, the mouth being ſtrongly bound up with cloth tied very tight with ropes. It is covered up with a madrier, or wooden plank, that has a cavity to receive the mouth of the petard, and faſtened down with ropes. Its uſe is in a clandeſtine attack to break down gates, bridges, barriers, &c. to which it is hung; and this it does by means of the wooden plank. It is alſo uſed in countermines to break through the enemy's galleries, and give their

their mines vent. The invention of petards is aſcribed to the French Huguenots in 1579, who with them took Cahors, as D'Aubigné tells us.

PETECHIÆ, in phyſick, are red or purple eruptions, like the bites of gnats, or fleas, that frequently appear in fevers and the ſmall-pox, and are always of very bad preſage. Sydenham juſtly apprehends, that they are very often excited and exaſperated by too warm medicines, and an overheating regimen.

PETECHIAL FEVER, *Febris petechialis*, *Febris lenticularis*, *Febris pellicaris*, in phyſick, a highly malignant and contagious fever, accompanied with ſpots of various colours appearing on the ſkin.

Among all the preſervatives againſt petechial fevers, there is none more effectual than the moderate uſe of good wine, eſpecially of the Rheniſh kind. In the beginning of petechial fevers no medicines are more beneficial than acids, eſpecially citron juice put into ptiſans, as alſo wine vinegar, either ſimple or diſtilled: beſides, ſuch medicines are alſo proper, as, without impairing the ſtrength, colliquate the ſaliva, and free the breaſt from infections. In the decline of a petechial fever, no excretion is more ſalutary than that made by ſtool coming on at a proper time.

PETER, or *Epiſtles of St.* PETER, two canonical books of the New Teſtament, written by the apoſtle St. Peter, and addreſſed to thoſe Jewiſh converts who were ſcattered throughout Pontus, Galatia, &c. not only upon the perſecution raiſed at Jeruſalem, but upon former diſperſions of the Jews into thoſe places. The firſt of theſe epiſtles is principally deſigned to comfort and confirm them under thoſe fiery trials they were then ſubject to; and to direct them how to behave in the ſeveral ſtates and relations, both of the civil and the Chriſtian life. In the ſecond epiſtle, the apoſtle proſecutes the ſame ſubject, to prevent their apoſtacy from the faith, and guard them againſt the corrupt principles of the Gnoſticks, and thoſe who ſcoffed at the promiſe of Chriſt's coming.

St. PETER'S *Day*, a feſtival of the Chriſtian church, obſerved on the twenty-ninth of June.

PETER-*Pence*, an ancient tax of a penny on each houſe, paid to the pope.

PETIOLE, *Petiolum*, in botany, the ſlender ſtalk that ſupports the leaves of a plant.

Some alſo uſe the word petiole for the middle rib of a leaf; the branches of which are called rami, and the ſubdiviſions of theſe ſurculi.

PETITIO PRINCIPII, in logick, the taking a thing for true, and drawing concluſions from it as ſuch; when it is really falſe, or at leaſt wants to be proved, before any inferences can be deduced from it.

PETITION, *Petitio*, a ſupplication in form, made by an inferior to his ſuperior.

PETRARIA, in antiquity, denotes an engine of war for caſting ſtones upon the enemy, eſpecially in ſieges.

PETREA, in botany, a plant which ariſes with a woody ſtalk to the height of 15 or 16 feet. This plant may be reckoned among the firſt claſs of beautiful American trees; it grows naturally in the Spaniſh W. Indies, and is propagated from ſeeds which with us muſt be obtained from the places where the trees grow naturally, and ſhould be ſown on a hot-bed. When the plants are up, they ſhould be placed ſingly in ſmall pots, in good, light, loamy earth, and plunged into the bark bed in the hot-houſe, where they ſhould always remain.

PETRIFACTION, or PETRIFICATION, in phyſiology, the act of converting fluids, woods, &c. into ſtone.

The faculty of petrifying wood is aſcribed to ſeveral ſprings, lakes, &c. But, in effect, there does not ſeem to be any real tranſmutation of the woody nature into the nature of ſtone; all that is done is this, the ſtony particles which before floated in the liquor, are now lodged and depoſited in the pores of theſe ſubſtances, in ſuch manner, and in ſuch plenty, as to leave little elſe but the appearance of a ſtone.

Petrifactions of waters and juices of the earth are inconteſtable. Of ſuch petrifying caves we have ſeveral in England.

PETROL, *Petroleum*, or *Petræ oleum*, in natural hiſtory, the oil of petre, or rock oil, an oleaginous juice, ſuppoſed to iſſue out of the clefts of rocks, and found floating on the water of certain ſprings.

This is the moſt frequent of all the liquid bitumens: It is an extremely ſubtile and penetrating fluid: it is very light and very pellucid, though ſometimes ſlightly tinged; it is of a pungent acrid taſte, and a ſtrong penetrating ſmell, very much like that of diſtilled oil of amber. It is very inflammable, taking fire at the approach of a candle, and burning almoſt wholly away.

It is found in many parts of the world, but no where ſo plentifully as in Italy, where they ſink wells for it, and, at 30 or 40 feet depth, they find it riſe in vaſt abundance with the water. It is alſo found trickling of itſelf down the ſides of hills along with the little ſtreams of water. It is alſo frequent in many parts of Germany and in France, where they have enough of it to make a traffick with: we are not without it in England, but we do not make uſe of it.

It is principally uſed externally in paralytick caſes, and in pains of the limbs. The French give it internally in hyſterick complaints, and their children againſt worms.

PETROSUM OS, in anatomy, the hard part of the temporal bone.

PETTEIA, a Greek term in the ancient muſick, to which we have no correſponding one in ours. The melopœia is divided into three parts, which the Greek call lepſis, mixis, and chreſis; and the Latins, ſumptio, mixtio, and uſus; and the Italians, preſo, meſo colamento, and uſo; the laſt is alſo called, by the Greeks, πεττεία, and, by the Italians, pettia, which is the art of making a juſt diſcernment of all the manners of combining ſounds, ſo as to produce the deſired effect; it is the ſame in muſick as manners are in poetry.

PETTY BAG, an office in Chancery, the three clerks whereof record the return of all inquiſitions out of every ſhire, make out all patents of cuſtoms, gaugers, comptrollers, &c.

PETTY or PETIT *Larceny*, in law, the ſtealing of things under the value of twelve-pence.

Anciently it was puniſhed either with the loſs of an ear, or cudgelling; after Edward III. it was for a long time whipping, but is now working on board the ballaſt-lighters.

PETTY or PETIT *Treaſon*, in law, the crime of a ſervant's killing his maſter, a wife's killing her huſband, a child's killing his parent, or a clergyman's killing his prelate, to whom he owes obedience.

The puniſhment for it is, that the criminal ſhall be drawn on a ſledge, or hurdle, to the gallows, and there hanged. The puniſhment of petit treaſon, in a woman, is the ſame with that of high treaſon, viz. hanging, drawing, and burning alive; the latter part is now generally diſuſed.

PEVETS, in a watch, the ends of the ſpindle of a wheel; the holes into which they run are called pevet-holes

PEWTER, a factitious metal uſed in domeſtick utenſils, being a mixture of ſix pounds of braſs and 15 pounds of lead to a 100 wt. of tin.

Pewter has occaſionally ſerved for money, particularly in Ireland, where the late James II. turned all the pewter veſſels, &c. of the proteſtants, he could ſeize, into crowns, half-crowns, and ſhillings, which he ordered to be current in all payments.

PHÆNOMENON, in phyſicks, an extraordinary appearance in the heavens or earth, either by obſervation of the celeſtial bodies, or by phyſical experiments, whoſe cauſe is not obvious. Such are meteors, comets, earthquakes, effects of the magnet, &c.

Sir Iſaac Newton ſhews, that all the phænomena of the heavenly bodies follow from the attraction of gravity, and almoſt every phænomenon of the leſs bodies from the attraction and repulſion between their particles.

PHAGEDÆNA, in chirurgery, ſignifies, in general, all kinds of ulcers which corrode the ſound parts adjacent thereto, and grow worſe, as they ſpread: ſometimes it only means a particular ſort of ulcer, as a herpes, noma, &c. in which ſenſe it is a tumid deep ulcer, that corrodes the ſubjacent fleſh, and the parts around it.

PHAGEDÆNICK MEDICINES, in phyſick, are ſuch as are uſed to eat off fungous or proud fleſh.

PHAGEDÆNICK *Water*, in chymiſtry, denotes a water drawn from quick-lime, ſo called from its efficacy in curing phagedænick ulcers.

To two pounds of quick-lime, in an earthen pan, are put

put 10 pounds of rain water, which after two days ſtanding, and frequent ſtirring, the water is at laſt, when well ſettled, poured off by inclination, filtered, and put into a glaſs bottle, with an ounce of corroſive ſublimate in powder. Then it is fit for uſe, in cleanſing wounds and ulcers, and to eat off ſuperfluous fleſh, particularly gangrenes, in which caſe a third or fourth part of ſpirit of wine may be added.

PHALANX, in Grecian antiquity, a ſquare battalion, conſiſting of 8000 men, with their ſhields joined, and pikes croſſing each other; ſo that it was next to impoſſible to break it.

PHALARIS, in botany, a genus of plants whoſe flower-cup conſiſts of an uniflorous, bivalvular, membranaceous glume; the corolla is alſo a bivalvular glume, ſcarce the length of the cup; the ſtamina are three capillary filaments, topped with ovate antheræ; it hath one roundiſh compreſſed ſeed, convex on one ſide, and contained in the corolla.

PHALEUCIAN VERSE, in ancient poetry, a kind of verſe which conſiſts of five feet, the firſt of which is a ſpondee, the ſecond a dactyl, and the three laſt trochees.

PHALLUS, in botany, a genus of cryptogamious plants, of the fungus kind; they are ſmooth underneath, but above are reticulated and callous.

PHANSY, FANCY, the ſame with imagination, which ſee.

PHARISEES, a famous ſect of the Jews, who diſtinguiſhed themſelves by their zeal for the traditions of the elders, which they derived from the ſame fountain with the written word itſelf; pretending that both were delivered to Moſes from Mount Sinai, and were therefore of equal authority. From their rigorous obſervance of theſe traditions, they looked upon themſelves as more holy than other men, and therefore ſeparated themſelves from thoſe whom they thought ſinners or prophane, ſo as not to eat or drink with them; and hence, from the Hebrew word *pharis*, which ſignifies to ſeparate, they had the name of phariſees, or ſeparatiſts.

PHARMACY, the art or ſcience which teaches the election, preparation, and mixture of medicines; conſtituting one part of the therapeutick branch of medicine, the objects of which are all natural bodies.

PHAROS, *Phare*, a light-houſe, or pile raiſed near a port, where a fire is kept burning in the night to direct veſſels near at hand.

The Pharos of Alexandria, built at the mouth of the Nile, was anciently very famous, whence the name was derived to all the reſt.

Ozanam ſays, Pharos anciently denoted a ſtreight, as the Pharos or Pharo of Meſſina.

PHARYNX, in anatomy, the upper opening of the œſophagus, ſituated at the bottom of the mouth, called alſo fauces. See ŒSOPHAGUS.

PHASES, in aſtronomy, the ſeveral manners wherein the moon, and the other planets, appear illuminated by the ſun.

To determine the PHASIS *of an eclipſe for any given time.* Find the moon's place in her viſible way for that moment, and thence, as a centre, with the interval of the moon's ſemi-diameter, deſcribe a circle: find, in like manner, the ſun's place in the ecliptick, and thence, with the ſemi-diameter of the ſun, deſcribe another circle; the interſection of the two circles ſhews the phaſes of the eclipſe, the quantity of obſcuration, and the poſition of the cuſps or horns.

PHASMATA, in phyſiology, certain appearances ariſing from the various tinctures of the clouds by the rays of the heavenly luminaries, eſpecially the ſun and moon. Theſe are infinitely diverſified by the different figures and poſitions of the clouds, and the appulſes of the rays of light, together with the occaſional flaſhings of different meteors, have occaſioned thoſe prodigies of armies fighting in the air, &c. of which we have ſuch frequent accounts in moſt writers.

PHEONS, in heraldry, the barbed heads of darts, &c. Sable, a feſſe ermin between three pheons, by the name of Egerton.

PHIDITIA, *Philitia*, in antiquity, feaſts celebrated with great frugality at Lacedæmon; they were held in the publick places, and in the open air, rich and poor aſſiſting alike at them, their deſign being to keep up peace and a good underſtanding among all the citizens. They were much the ſame with the chariſtia at Rome.

PHILADELPHUS, in antiquity, a title borne by ſeveral kings. The moſt famous of this name was Ptolemy Philadelphus, who erected a library at Alexandria, and furniſhed it with 400,000, others ſay 700,000 volumes, by the advice of Demetrius Phalereus: the ſame Philadelphus, alſo, procured the verſion of the bible, called the Septuagint.

PHILANTHROPY, *Philanthropia*, love of mankind, a general benevolence toward the ſpecies.

PHILIPPICKS, *Philippicæ*, in literature, the orations of Demoſthenes againſt Philip of Macedon.

The Philippicks are eſteemed the maſter-pieces of that great orator. Longinus quotes abundance of inſtances of the ſublime from them, and points out a thouſand latent beauties therein. Demoſthenes's chief talent, according to him, was that of moving and aſtoniſhing.

PHILIPPICK, is alſo applied to the 14 orations of Cicero againſt Marc Antony. They had this appellation given them by Cicero himſelf in his epiſtles to Brutus. Juvenal calls the ſecond conſpicuæ divina philippica famæ.

Theſe, his laſt and moſt valued orations, coſt Cicero his life, Marc Antony having been ſo irritated with them, that when he was arrived at the triumvirate, he procured Cicero's murder, cut off his head, and ſtuck it up in the very place whence the orator had delivered the philippicks.

PHILLYREA, an evergreen ſhrub, and propagated from ſeeds or layers, in autumn. The leaves and bark of this ſhrub are ſaid to be aſtringent, and good in ulcers of the mouth; but they are little regarded in the preſent practice.

PHILOLOGY, an aſſemblage of ſeveral ſciences, conſiſting of grammar, rhetorick, poetry, antiquities, hiſtory, and criticiſm. It is a kind of univerſal literature converſant about all the ſciences, their riſe, progreſs, authors, &c. being what the French call the belles lettres. It is called in the univerſities *humanities*, or *literæ humaniores*.

Eratoſthenes, library-keeper at Alexandria, under Ptolemy Philadelphus, was the firſt, according to Suetonius, that was called philologus, or critick, according to Clemens Alexandrinus.

PHILOMATHES, a lover of learning or ſcience.

PHILONIUM, in pharmacy, a kind of ſomniferous anodyne opiate, taking its name from Philo the inventor.

PHILOSOPHER, a perſon well verſed in philoſophy, or who applies himſelf to the ſtudy of nature and morality.

PHILOSOPHICK, or PHILOSOPHICAL, ſomething that relates to philoſophy.

PHILOSOPHICK CHYMISTRY, is defined by Shaw, an art of dividing or reſolving all the bodies in our power, by means of all the inſtruments that can be procured, and that as well into integrant as into conſtituent parts, and joining theſe parts together again, ſo as to diſcover the principles, relations, and changes of bodies, make various mixtures and compoſitions, find out the phyſical cauſes of phyſical effects; and hence improve the ſtate of natural knowledge, and the arts depending on it. See CHYMISTRY.

PHILOSOPHICAL EGG, among chymiſts, a thin glaſs-body, or bubble, of the ſhape of an egg, with a long neck or ſtem, uſed in digeſtions.

PHILOSOPHY, the knowledge or ſtudy of nature and morality, founded on reaſon and experience.

So wild and extravagant have been the greater part of philoſophers, ancient and modern, that it is hard to determine whether they have been more diſtant in their ſentiments from truth, or from one another; owing perhaps to their neglecting the uſe of geometry and experiments, the moſt neceſſary helps to the diſcovering of cauſes, and proportioning them to their effects.

The manner of philoſophizing among the ancients, was to aſcribe to bodies certain arbitrary properties, ſuch as beſt anſwered their purpoſes in accounting for the phænomena of nature; whence proceeded ſo many various ſects of philoſophers; every one of them aſſigning a different cauſe to the ſame appearance.

The chief agreement between them conſiſted in their conceiving

conceiving all bodies to be compositions of air, earth, fire, and water, or some one or more of them, from whence they acquired the name of principles or elements, which they still retain. Epicurus advanced a little further, who asserted, that though bodies consisted of some one or more of these, yet that they were not strictly elements, but that these themselves consisted of atoms; by an accidental concourse of which (as they were moving through infinite space in lines nearly parallel) all things received their form and manner of existence.

Des Cartes has contrived an hypothesis very different from the rest; he sets out with a supposition that the universe was at first entirely full of matter; that from this matter, when first put in motion, there would necessarily be rubbed off (by the grinding of the several parts one against another) some particles sufficiently fine to pass through the hardest and most solid bodies, without meeting with any resistance; of this consists his materia subtilis, or materia primi elementi. He imagined, that from hence also would result other particles of a globular form, to which he gave the name of materia secundi elementi. Those who did not so far lose their first figure, as to come under the denomination of materia primi or secundi elementi, he called materia tertii elementi; and maintained that all the variety which appears in natural bodies, was owing to different combinations of those elements.

He likewise supposes that God created a certain quantity of motion, and assigned it this mass of matter, and that that motion (being once created) could no more be annihilated without an omnipotent hand, than body itself; in consequence of which he was obliged to teach, that the quantity of motion is always the same: so that if all the men and animals in the world were moving, yet still there would be no more than when they were at rest, being transferred to the æther. So unaccountable are the notions of this great philosopher, that it is surprising his doctrine should have met with so universal reception, and have got so strong a party of philosophers on its side; that, notwithstanding it was more absurd than the schoolmen's substantial forms, they must be all exploded to make way for his hypothesis.

Des Cartes has been said, by a late writer, to have joined to his great genius an exquisite skill in mathematicks, and, by mixing geometry and physicks together, to have given the world hopes of great improvements in the latter. But this writer ought to have considered, that what he looked upon in Des Cartes's book of principles, as demonstrations, are only illustrations, there not being a demonstration from geometry in all his philosophical works.

The present method of philosophising, established by Sir Isaac Newton, is to find out the laws of nature by experiments and observations. To this, with a proper application of geometry, is owing the great advantage the present system of philosophy has over all the preceding ones, and the vast improvement it has received within the last age. It is, indeed, in vain to imagine, that a system of natural philosophy can be framed by any other method, for, without observations, it is impossible we should discover the phænomena of nature; without experiments, we must be ignorant of the mutual actions of bodies; and, without geometry, we can never be certain whether the causes we assign be adequate to the effects we would explain, as the various systems of philosophy, built on other foundations, evidently shew.

This way of searching into nature was first proposed by my lord Bacon, and prosecuted by the Royal Society, the Royal Academy at Paris, the honourable Mr. Boyle, Sir Isaac Newton, &c.

What wonderful advancement in the knowledge of nature may be made by this method of enquiry, when conducted by a genius equal to the work, will be best understood, by considering the discoveries of that excellent philosopher last mentioned. To him it is principally owing, that we have now a rational system of natural philosophy; it is he, who, by pursuing the sure and unerring method of reasoning from experiments and observations, joined with the most profound skill in geometry, has carried his enquiries to the most minute and invisible parts of matter, as well as to the largest and most remote bodies in the universe, and has established a system not subject to the uncertainty of a mere hypothesis, but which stands upon the secure basis of geometry itself.

Philosophy may be divided into theoretical and practical.

Theoretical or *speculative* PHILOSOPHY, is that employed in mere contemplation, and which terminates therein. This, again, is usually subdivided into three, namely, pneumaticks, physicks or somaticks, and metaphysicks or ontologia. The first considers spirits or beings abstracted from all matter, the second considers material things, and the third extends to each indifferently.

Practical PHILOSOPHY, is that which lays down the rules of a virtuous and happy life, and excites us to the practice thereof; and this is properly ethicks alone: yet most authors divide it into two, answerable to the two sorts of human actions to be directed thereby, namely, logick, which governs the operations of the understanding, and ethicks which regulate those of the will.

PHILOSOPHY also denotes the particular system of opinions broached by some considerable philosopher, and espoused by his followers. It also denotes a certain manner of philosophising, as the corpuscular, &c. philosophy. And it is again considered, with regard to the age or place where it was taught, as the scholastick, new, &c. philosophy.

PHILTER, *Philtre*, *Philtrum*, in pharmacy, &c. a strainer. It also denotes a potion, which, it is pretended, will excite love.

PHIMOSIS, in medicine, a disease of the penis, wherein the præputium is so strongly constringed upon the glands, that it cannot be drawn back.

PHIMOSIS also denotes a disease of the eyes, wherein the eye-lids are so bound together by the mediation of some glutinous matter, as not to be opened.

PHLEBOTOMY, *Phlebotomia*, in medicine and surgery, the art or operation of letting blood.

There is not a more excellent, instantaneous, and efficacious remedy for removing various diseases both of the acute and chronical kind, than venesection, prudently and cautiously used; for some violent disorders of the most dangerous nature arise from a redundance of blood, from a suppression of its critical evacuations from the uterus in women, and a defect or interruption of the hæmorrhoidal discharge in men. A phlethora, by retarding and stopping the free and equable circulation, lays a foundation for impurities of the humours, stagnations, infarctions, obstructions, extravasations, and ruptures of the vessels: for while the blood, by its too great quantity, strongly resists the contractile and elastick force of the heart, arteries, and other vessels, its progressive motion through the whole body is not only retarded, so that it becomes thick, and fit for generating infarctions and obstructions, the fruitful sources of chronical disorders, but also in delicate patients, and highly nervous parts, by exciting spasmodick strictures, it induces an inequality in the circulation of the humours, and violent and impetuous congestions, to some of the nobler parts, which lay a foundation for terrible disorders in the head, breast, and præcordia: these dangerous disorders are not only prevented, but presently relieved by venesection seasonably and duly instituted, especially in patients who abound with blood, have large and full vessels, or who labour under a suppression of the menses, or hæmorrhoids. When in the spring, and about the equinox, the air, on account of the nearness of the sun to our climate, becoming thin and rare, produces a violent expansion in the blood, there is great danger of those diseases which arise from a phlethora, as Hippocrates justly observes; so that, before these seasons come on, it is expedient to lessen the redundance of the blood by venesection, and by that means prevent the approaching disorders: nor is it absolutely necessary we should always accurately observe these equinoctial seasons; for when the quantity of congested blood requires a more speedy and expeditious evacuation, or when about the end of February, and beginning of March, the serene and tepid state of the atmosphere produces an expansion and turgescence of the blood, which prove injurious to its progressive motion, we are not to wait for, but, without hesitation, to anticipate the equinox. We have known some, who, from an ill-timed adherence to their usual custom, have delayed venesection till the equinox, whilst, in the mean time, the phlethora increasing, they died of an apoplectick fit

it before that time: nor are we to liften to thofe who affirm that venefection is only proper at certain periods of the moon, or when certain conjunctions of the ftars happen: but we are boldly, and without any fcruples, to take blood from plethorick patients under all the phafes of the moon, and every conjunction of the ftars, efpecially, if the atmofphere is ferene and calm: thofe alfo who abound with blood, ought to ufe venefection about the autumnal equinox, left the blood fhould, by the winter cold, be infpiffated, and become fordid, the excretions being difturbed by the inclemency and variation of the weather; by which means, a foundation is laid for this diforder, which proceeds from an impurity and ftagnation of the humours. Some who greatly abound in blood, ought to preferve themfelves from diforders, by ufing venefection thrice a year, that is, in the beginning of March, and the ends of May and September.

As a redundance of blood indicates venefection, a penury of it and a defect of ftrength contra-indicate this operation. A redundance of blood is fufficiently known from the repletion of the veffels, the largenefs of the pulfe, the luxurious diet, the quiet and calm method of life, and the intermiffion of any critical, natural, or artificial evacuation; for when all thefe circumftances concur, we may fafely and boldly ufe venefection. On the contrary, when the body is infirm and emaciated, and the pulfe weak, in confequence of a want of blood and ftrength, venefection is abfolutely to be condemned, unlefs we intend to do an immediate mifchief to the patient; for the ftrength of the pulfe depends on the large and brifk impetus, with which the blood is conveyed, from the left ventricle of the heart, into the large anterior tube: now the ftrength of the heart, to form this expulfion, depends on the free and fufficient motion of the blood through the coronary veffels into the fubftance of the heart, as, alfo, on the influx of the nervous fluid into the fibres of the heart; when, therefore, the pulfe is weak, fmall, and languid, from too fcanty an influx of the nervous fluid, and a laudable blood, and too weak an impulfe of the blood into the arteries, it is highly prejudicial to open a vein in any patient, or in any diforder, becaufe it more exhaufts the blood and ftrength, which are already too much impaired. Phlebotomy, or bleeding by the veins, is performed by making an incifion in a vein with a fine fharp-pointed inftrument, or lancet, by which as much blood is taken away, as may be proper for reftoring or preferving the health of the patient.

This operation may not improperly be called venefection, and is not only extremely beneficial, but of a very ancient date, having been commended and practifed about 3000 years, as we learn from the writings of Hippocrates, Celfus, and other ancient authors upon furgery. Yet fome phyficians, both ancient and modern, fuch as Erafiftatus, Paracelfus, Helmont, Portius Bentekoe, Gehema, and others, have afferted it to be a moft pernicious and unlawful operation, and have termed the practifers of it no lefs than the deftroyers and butchers of mankind. But experience fhews us, that all their objections are trifling and unjuft; and that there is no remedy in the whole art of medicine more ready or ferviceable, in curing or preventing the generality of difeafes, than phlebotomy Some relate that phyficians took the hint of this operation from the hippopotamus, or fea horfe, who, at certain feafons, ufed to open a vein with a fharp-pointed reed

Bleeding, according to the vulgar opinion, is a very eafy operation. In fome perfons, we own that the veins are fo large and confpicuous, that they may be opened, by novices, without danger or difficulty. But in others they are fo fmall, or fo deeply feated, that they cannot be difcovered by the moft expert furgeon without difficulty, nor opened without danger. For the arteries, or the nerves and tendons adjacent to the veins, are very liable to be wounded by the lancet; a misfortune which is generally attended with violent pains, convulfions, inflammations, profufe hæmorrhages, aneurifms, gangrenes, and, fometimes, a moft miferable death; and, therefore, this operation, as well as others, requires caution and attention, fince the reputation of young furgeons, efpecially, may fuffer as much by a timorous introduction of the lancet, fo that the blood follows not, as when, by affecting to perform eafily and expeditioufly, a misfortune fhould enfue.

An expert phlebotomift fhould have an active, gentle, and fteady hand, a clear fight, and an intrepid mind; for without thefe qualifications, he will be fubject either to mifs the vein, or to occafion fome mifchief which may be fatal to the patient. This is the reafon why the dexterity of furgeons in bleeding gradually declines as they advance in years; for as age increafes, the eyes become weak, and the hands unfteady.

PHLEGM, in chymiftry, an aqueous and infipid fluid, fuppofed to be found in all natural bodies. See ANALYSIS.

PHLEGM, or *Pituita*, in the animal œconomy, is one of the humours whereof the ancients fuppofed the mafs of blood to confift.

PHLEGMAGOGUE, *Phlegmagogus*, in medicine, is applied to fuch cathartics as purge off phlegm.

PHLEGMATICK, *Phlegmaticus*, a temperament wherein phlegm is the prevailing humour.

PHLEGMON, in medicine, denotes, in the general, all inflammations.

PHLEUM, in botany, a genus of plants, the corolla of which confifts of two valves; and the feed, which is fingle, is included within the calyx and corolla.

PHLOMIS, Jerufalem fage, in botany, a genus of plants, whofe flower is monopetalous and labiated; the tube is oblong; the upper lip is ovate, compreffed, forked, and incumbent; the under is trifid; the middle fegment is large, bilobate, and obtufe: it hath four triquetrous feeds placed in the bottom of the cup.

The leaves of this plant are accounted aftringent and vulnerary.

PHŒNIX, in aftronomy, one of the conftellations of the fouthern hemifphere, unknown to the ancients, and invifible in our northern parts: it is faid to confift of thirteen ftars.

PHOENIX, in natural hiftory, the name of a famous bird among the ancients, but generally looked upon by the moderns as fabulous.

The ancients fpeak of this bird as fingle, or the only one of its kind: they defcribe it as of the fize of an eagle; its head finely crefted with a beautiful plumage, its neck covered with feathers of a gold colour, and the reft of its body purple, only the tail white, and the eyes fparling like ftars; they hold, that it lives 5 or 600 years in the wildernefs; that, when thus advanced in age, it builds itfelf a pile of fweet wood and aromatick gums, and fires it with wafting of its wings, and thus burns itfelf; and that from its afhes arifes a worm, which in time grows up to be a phœnix.

PHOENIX, the great-palm, or date, in botany, a tree which rifes to a great height.

Thefe trees have male flowers on different plants from thofe which produce the fruit; and there is a neceffity for fome of the male trees to grow near the female ones, to render them fruitful, or at leaft to impregnate the ovary of the feed, without which, the ftones which are taken out of the fruit will not grow. Moft of the old authors who have mentioned this tree, affirm, that unlefs the female, or fruit-bearing palm-trees, have the affiftance of the male, they are barren; therefore, in fuch places where there are no male trees near the female, the inhabitants cut off the bunches of male flowers, when they are juft opened, and carry them to the female trees, placing them on the branches near the female flowers to impregnate them, which they all agree has the defired effect, rendering the trees fruitful which would otherwife have been barren.

The flowers of both fexes come out in very long bunches from the trunk, between the leaves, and are covered with a fpatha, or fheath, which opens and withers; thofe of the male have fix fhort filaments, with narrow four-cornered antheræ, filled with farina; the female flowers have no ftamina, but have a roundifh germen, which afterwards becomes an oval berry, with a thick pulp, inclofing a hard oblong ftone, with a deep furrow, running longitudinally.

Thefe plants grow in great plenty in Africa, alfo in Arabia, Syria, Perfia, and Greece. The dates, or fruit of the palm, are diftinguifhed according to their degrees of ripenefs; thofe are beft which are large, full, fat, and of a yellowifh colour: they are fomewhat aftringent until thoroughly ripe, and are then much of the fame nature as figs.

They

They are ſaid to be good in hoarſeneſs, infarctions of the lungs, and ſandy obſtructions of the reins and bladder; they ſtrengthen the ſtomach, ſtop looſeneſſes, and corroborate the inteſtines: they are alſo good in diſeaſes of the breaſt; and the ſtones are reckoned very diuretick, and good in ſtranguries. Outwardly, dates are uſed ſometimes in ſuppurative cataplaſms.

PHOLAS, a ſhell-fiſh of the multivalve kind, compoſed of five pieces, three of which are very ſmall, ſo that they ſeem, to a ſuperficial obſerver, to be made up of only two ſhells.

PHOLIS, in natural hiſtory, a name given to the gypſoms of a bright appearance.

PHONICKS, the doctrine or ſcience of ſounds, otherwiſe called acouſticks. See SOUND.

PHOSPHORUS, in phyſiology, a denomination given to all bodies which ſhine and ſeem to burn, without having any degree of heat.

Chymiſtry, ſays Dr. Shaw, hath ſcarce afforded any thing more ſurpriſing than the common phoſphorus. To ſee letters traced with this matter become luminous in the dark, images and the bodies of men to blaze with light, and abundance of the like experiments, performed by means of phoſphorus, muſt awaken the curioſity of thoſe who have ſeen theſe experiments, and render them deſirous of being acquainted with the method of preparing it. The preparation, even to this day, is kept as a ſecret in few hands, and the matter ſold at a very high price. Whence we apprehend, it would be no unacceptable preſent to the world, to render this commodity cheaper, and diſcover its further uſes.

The ſucceſsful method of preparing the phoſphorus of urine, is this: evaporate any quantity of freſh urine over a gentle fire, to a black and almoſt dry ſubſtance; then, with two pounds thereof, thoroughly mix twice its weight of fine ſand; put this mixture into a ſtrong-coated ſtone long-neck; and having poured a quart or two of clear water into a large receiver, join it to the long-neck, and work it in a naked fire: let the heat be ſmall for the firſt two hours; then increaſe it gradually to the utmoſt violence; and continue this for three or four hours ſucceſſively: at the expiration of which time, there will paſs into the receiver a little phlegm and volatile ſalt, much black and fœtid oil, and, laſtly, the matter of phoſphorus, in form of white clouds, which either ſtick to the ſides of the receiver, like a fine yellow ſkin, or fall to the bottom in form of ſmall ſand. Now let the fire go out, but let the receiver continue till all be cold, leſt the phoſphorus take fire on admiſſion of the air.

To reduce theſe ſmall grains into one piece, put them into a little tin ingot-mould, with water; heat the ingot to make the grains melt together; then add cold water, till the matter is congealed into one ſolid ſtick, like bees-wax; which being cut into ſmall pieces fit to enter the mouth of a vial, may be preſerved by water, and keeping the glaſs cloſe ſtopped. If the glaſs were not to be ſtopped, the phoſphorus would turn black on its ſurface, and at length be ſpoiled.

PHOTINIANS, a ſect of Chriſtians in the fourth century, ſo called from Photinus, their chief, who was biſhop of Sirmich, in Hungary, and maintained that Jeſus Chriſt was true man, but not true God, nor born before all ages; and that he only began to be Chriſt when the Holy Ghoſt deſcended upon him in the river Jordan. Theſe doctrines were condemned in ſeveral aſſemblies, and particularly by the Arians, in a ſynod held at Sirmich in the year 351.

PHRASE, in grammar, a manner of ſpeech peculiarly adapted to certain occaſions, arts, languages, &c.

Sometimes the word phraſe is uſed for a ſhort ſentence. See SENTENCE.

PHRASEOLOGY, in matters of literature, a collection of the phraſes, and elegant expreſſions, in any language.

PHRENES, in anatomy, the name by which Hippocrates, and the ancient phyſicians, called the diaphragm, as ſuppoſing it to be the ſeat of the rational ſoul.

PHRENETICK VESSELS, in anatomy, the nerves, arteries, and veins which are ſpread over the diaphragm. The phrenetick nerves ariſe from the cervical ones; the phrenetick arteries ariſe out of the deſcending aorta, and are diſtributed through the diaphragm and pericardium; and the two phrenetick veins diſcharge their contents into the vena cava.

PHRENSY, in medicine, an inflammation of the membranes of the brain, attended with an acute fever and delirium.

This diſeaſe requires the ſpeedieſt applications of all others; profuſe hæmorrhages of the noſe often reſolve it, and copious bleeding in the temporal arteries, is the moſt efficacious remedy. The diet ſhould be water-gruel, acidulated; and the drink barley-water, ſmall beer, or the decoction of tamarinds.

PHTHIRIASIS, in medicine, the pedicularis morbus, or louſy diſeaſe, is moſt incident to children, though adults are not wholly exempt from it.

Cleanneſs and wholeſome food are beſt for preventing this diſorder, which may be cured by waſhing the body with a lixivium of wormwood, ſtaves-acre, leſſer centaury, and oak-aſhes; adding ſome common ſalt. All the bitters, ſour and ſalt things, are here recommended; as is alſo mercury, which infallibly deſtroys theſe vermin; but it ought to be uſed with great caution, even by adults, and ſhould never be uſed in applications to children.

PHTHISIS, a ſpecies of conſumption ariſing from an ulcer of the lungs. See CONSUMPTION.

PHYGETHLON, in medicine, is, according to Celſus, a broad but not much elevated tumour, in which there is ſome reſemblance of a puſtule; it is attended with violent pain and diſtenſion, and ſometimes there is a ſmall fever.

PHYLACTERY, among the Jews, was a ſlip of parchment, whereon was wrote ſome text of ſcripture, particularly of the decalogue, which the more devout wore on the forehead, breaſt, or neck.

PHYLACTERY, among the ancients, was in general a kind of charm or ſpell which they wore about them as amulets to preſerve them from dangers or diſeaſes.

PHYMA, in medicine, comprizes all kinds of preternatural tumours in the body, eſpecially ſuch as affect the external parts, and increaſe and maturate in a ſhort time.

PHYSICK, the art of healing, properly called medicine. See MEDICINE.

PHYSICAL, ſomething belonging to nature.

PHYSICIAN, one who profeſſes the art of healing.

The ancients diſtinguiſhed their phyſicians into various claſſes, as rational, methodical, dogmatical, empirical, galenical, ſpagyrical, or chymical phyſicians, &c.

PHYSICKS, *Phyſica*, *Phyſiology*, *natural Philoſophy*, the doctrine of natural bodies, their phænomena, cauſes and effects, with the various affections, operations, &c. thereof. The origin of phyſicks is referred by the Greeks to the Brachmans, Magi, and the Hebrew and Egyptian prieſts; from theſe it was derived to the Greek ſages, particularly Thales; hence it deſcended into the Pythagorick, Platonick, and Peripatetick ſchools; whence it was propagated into Italy, and thence through the reſt of Europe.

Phyſicks may be divided, with regard to the manner wherein it has been handled, and the perſons by whom.

Symbolical PHYSICKS, that couched in ſymbols, arithmetical and geometrical characters, and hieroglyphicks.

Peripatetical PHYSICKS, that of the Ariſtotelians, who explained the nature of things by matter, form, privation, elementary and occult qualities, ſympathies, &c.

Experimental PHYSICKS, that which enquires into the reaſons and natures of things from experiments, in chymiſtry, hydroſtaticks, &c. This has been very much cultivated ſince the time of lord Bacon, and continues to be ſo with very great ſucceſs.

Mechanical or *corpuſcular* PHYSICKS, that which explains the appearances of nature from the matter, motion, ſtructure, and figure of bodies and their parts, according to the ſettled laws of nature and mechanicks.

PHYSIOGNOMICKS, denotes, among ſome phyſicians, ſuch ſigns as are taken from the countenance to judge of the ſtate, &c. of the body and mind.

PHYSIOGNOMY, *Phyſiognomia*, the art of judging of a perſon's nature, fortune, or diſorders, by the lineaments of the face.

PHYSIOLOGY, *Phyſiologia*, the doctrine of natural bodies, called alſo phyſicks and natural philoſophy.

It properly denotes an internal reaſoning that terminates in the ſpeculation of its object, ſuch as natural appearances,

appearances, their caufes, &c. So that chymiftry is a counterpart to phyfiology, imitating nature rather than explaining her.

PHYSIOLOGY, in medicine, that branch which confiders nature with refpect to the cure of difeafes, particularly the human body, its parts, ftructure, health, life, functions, œconomy, &c.

PHYTOLACCA, American night-fhade, in botany, a genus of decandrious plants, whofe flower confifts of five roundifh, concave, fpreading, perfiftent petals: the fruit is an orbiculated depreffed berry, with 10 longitudinal furrows, and the fame number of cells, each containing a fmooth kidney-fhaped feed. It is very common in our North-American plantations; and is cultivated in England for the beauty of its flowers: it may be propagated by fowing the feeds in the fpring upon a bed of light rich earth, and when the plants are come up, they fhould be moved into the borders of large gardens, allowing them room enough to grow, for they become very large. The planters take a fpoonful or two of the juice of the root as a purge, and that very frequently. The berries are full of a purple juice, which gives a fine tincture to paper, but will not laft long; if there could be a method of fixing the dye, it might be made very ufeful.

PHYTOLOGY, a treatife of plants, defcribing their forms, kinds, properties, &c.

PIA MATER, *Meninx tenuis*, in anatomy, a fine membrane that immediately invefts the brain. See BRAIN.

PIAZZA, in building, a portico or covered walk fupported by arches.

PICA, in medicine, a depravation of appetite, whereby the patient abfurdly defires after things unfit for food.

PICKET, PIQUET, in fortification, a ftake fharp at one end, and ufually fhod with iron, ufed in laying out the ground, to hold fafcines in any work caft up in hafte; and it is alfo applied to a fharp ftake which is made a kind of punifhment for a foldier to ftand on with one foot for fome offence.

PICKETS, in a camp, are alfo ftakes driven into the ground near the tents of the horfemen to tie their horfes to; and before the tents of the foot, for the mufkets to reft about in a ring.

PICKLE, a liquor commonly made of falt, water, or vinegar, &c. and fometimes with the addition of fpices, wherein meats, fruits, &c. are preferved and feafoned. It alfo denotes the fruit, root, &c. prepared therein.

PICQUEERING, *Pickeering*, *Pickerooning*, a little flying fkirmifh, which foldiers make, when detached for pillage, or before a main battle begins.

PICTS WALL, in antiquity, a famed piece of Roman work, begun by the emperor Adrian, on the northern bounds of England, to prevent the incurfions of the Picts and Scots: at firft it was only made of turf, ftrengthened with pallifadoes, till the emperor Severus, coming in perfon into Britain, built it with folid ftone, reaching eight miles from the Irifh to the German fea, or from Carlifle to Newcaftle, with watch-towers garrifoned at the diftance of a mile from each other. It was ruined feveral times by the Picts, and often repaired by the Romans. At laft Aetius, a Roman general, rebuilt it of brick; and the Picts ruining it the year following, it was no longer regarded but as a boundary betwixt the two nations. It was eight feet thick, and twelve high from the ground; it ran on the north fide of the rivers Tyne and Irrhing, up and down feveral hills; the remains of which are, to this day, to be feen in Cumberland and Northumberland.

PICTURE, *Pictura*, a piece reprefented in colours on canvas, wood, &c. and inclofed commonly in a frame.

PIECE, in commerce, fometimes denotes a whole, and fometimes only a part of the whole.

PIECE, in matters of money, is fometimes the fame thing with fpecies, and fometimes it denotes fuch as have no other particular name.

In England, piece fometimes is ufed for 20 fhillings, and fometimes for a guinea. By 6 Geo. II. c. 25. broad-pieces of 25 or 23 fhillings value, their halves and quarters are called in; and all perfons forbid to receive or utter them in tale.

PIECE *of Eight*, *Rial of Eight*, or *Piaftre*, a filver money firft ftruck in Spain, afterwards in other countries, and now current almoft every where. It is equal to eight filver rials. Its value is nearly the fame with the late French crown, or four fhillings and fix-pence fterling.

There are two kinds of piaftres, or Spanifh crowns, the one ftruck at Portofi, the other at Mexico; the latter are a little heavier than the former, but not quite fo fine. The piece of eight is divided into halves, quarters, half-quarters, and fixteenths. The exchange between England and Spain is in pieces of eight.

PIECE, is alfo a kind of money of account ufed among the negroes on the coaft of Angola in Africa.

PIECE, in heraldry, denotes an ordinary charge.

The honourable pieces of the fhield are the chief, fefs, bend, pale, bar, crofs, faltier, chevron; and, in general, all thofe which may take up one third of the field, when alone, and in what manner foever it be.

PIECES, in the military art, denote all forts of great guns and mortars.

Field PIECES, are a fmaller fort, carrying balls of 10 or 12 pounds.

Battering PIECES, are the larger fort of guns ufed at fieges for making of breaches, fuch as the 24 pounders and the culverin, which laft carries a ball of 18 pounds.

PIEDOUCHE, in architecture, a little pedeftal, either oblong or fquare, enriched with mouldings, ferving to fupport a buft.

PIEDROIT, in architecture, a pier or fquare kind of pillar, part whereof is hid within a wall.

PIED-*Powder-Court*, an ancient court held in fairs, for rendering juftice to buyers and fellers, and the redrefs of grievances.

PIER, or PEER, a building of ftone, &c. oppofed againft the force of the fea, or a large river, for the fecurity of fhips that lie at harbour in any haven.

PIERS, in architecture, are a kind of pilafters or buttreffes, raifed for fupport, ftrength, and fometimes for ornament.

Piers are a fort of fquare pillars, part of which is hid within the wall; the only thing, wherein it differs from a pilafter, being this, that the latter has a bafe and capital, which the former has not.

PIETISTS, a religious fect fprung up among the proteftants of Germany, feeming to be a kind of mean between the Quakers of England, and the Quietifts of the Romifh church. See QUAKERS, &c.

They defpife all forts of ecclefiaftical polity, all fchool theology, and all forms and ceremonies, and give themfelves up to contemplation and the myftick theology.

PIG, in zoology, the young of the hog kind. See HOG.

PIG *of Lead*, the eighth part of a fother, amounting to 250 pounds weight.

PIGMENTS, *Pigmenta*, preparations ufed by painters, dyers, &c. to impart colours to bodies, or imitate particular colours. In painting on glafs, or for counterfeiting gems, the pigment is ufually of a metalline or mineral nature.

PIKE, in war, an offenfive weapon, confifting of a wooden fhaft, 12 or 14 feet long, with a flat fteel head pointed, called the fpear. The pike was long in ufe among the infantry, but now the bayonet, which is fixed on the muzzle of the carabine, is fubftituted in its ftead. Yet it ftill continues the weapon of foot officers, who fight pike in hand, falute with the pike, &c. The Macedonian phalanx was a battalion of pike-men.

PILASTER, in architecture, a fquare column, fometimes infulated, but more frequently let within a wall, and only fhewing a 4th or 5th part of its thicknefs. The pilafter is different in different orders: it borrows the name of each, and has the fame proportions, and the fame capitals, members and ornaments with the columns themfelves. Pilafters are, however, ufually made without either fwelling or diminution, and as broad at top as at the bottom; though fome of the modern architects, as M. Manfard, &c. diminifh them at the top, and even make them fwell in the middle, like columns, particularly when placed behind columns.

PILE, in antiquity, a pyramid built of wood, on which the bodies of the deceafed were laid in order to be burned.

PILE, in building, is ufed for a large ftake rammed into the ground in the bottom of rivers, or in marfhy land, for a foundation to build upon.

Pile is alfo ufed among architects for a mafs of building.

PILE,

Pilé, in coinage, denotes a kind of puncheon, which, in the old way of coining with the hammer, contained the arms, or other figure, and inſcription, to be ſtruck on the coin. Accordingly, we ſtill call the arms-ſide of a piece of money, the pile: and the head, the croſs; becauſe, in ancient coins, the croſs generally took the place of the head in ours: but ſome will have it called pile, from the impreſſion of a ſhip built on piles, ſtruck on this ſide in our ancient coins.

Pile, in heraldry, an ordinary in form of a wedge, contracting from the chief, and terminating in a point towards the bottom of the ſhield.

Piles, in medicine, the ſame with hæmorrhoids. See Hæmorrhoids.

PILGRIMAGE, a kind of religious diſcipline, which conſiſts in taking a journey to ſome holy place, in order to worſhip the relicks of ſome deceaſed ſaint.

PILL, in pharmacy, a form of medicine reſembling a little ball, to be ſwallowed whole, invented in favour of ſuch as cannot take bitter and ill-taſted medicinal draughts, as alſo to keep in readineſs for occaſional uſe without decaying.

PILLAGE, among builders, is a ſquare pillar, ſtanding behind a column, to bear up arches.

PILLAR, in architecture, a kind of irregular column, round and inſulated, but deviating from the proportions of a juſt column.

Pillars are always either too maſſive, or too ſlender for regular architecture; ſuch are the pillars that ſupport Gothick vaults, or buildings; and, indeed, they are not reſtrained by any rules, their parts and proportions being arbitrary.

Butting-Pillar, the ſame with a buttreſs. See the article Buttress.

Square-Pillar, a maſſive work, called alſo a pier, or piedroit, ſerving to ſupport arches, &c.

Pillar, in the menage, is the centre of the ring or menage-ground, round which a horſe turns, whether there be a pillar in it or not.

Beſides this, there are pillars in the circumference, or ſides of the menage-ground, placed at certain diſtances, by two and two; whence they are called the two pillars, to diſtinguiſh them from that of the centre.

PILLORY, was anciently a poſt erected in a croſs-road, by the lord of the manor, with his arms upon it, as a mark of his ſeigniory, and ſometimes with a collar to fix criminals to.

At preſent it is a wooden machine, made to confine the head and hands, in order to expoſe criminals to publick view, and to render them publickly infamous.

PIMENTA, or Pimento, in the materia medica, Jamaica pepper, or all-ſpice, the dried aromatick berry of a large tree growing in the mountainous parts of Jamaica, reckoned a ſpecies of myrtle, and called by Sir Hans Sloane, *myrtus arborea aromatica foliis laurinis*; by Linnæus, *myrtus foliis alternis*.

Pimenta is a moderately warm ſpice, of an agreeable flavour, ſomewhat reſembling that of a mixture of cloves, cinnamon, and nutmegs. Diſtilled with water it yields an elegant eſſential oil, ſo ponderous as to ſink in the aqueous fluid, in taſte moderately pungent, in ſmell and flavour approaching to oil of cloves, or rather a mixture of thoſe of cloves and nutmegs: the remaining decoction inſpiſſated, leaves an extract ſomewhat ungrateful, but not pungent, and the berry itſelf is found to be almoſt wholly deprived of its taſte as well as flavour; the warmth of this ſpice reſiding rather in the volatile than in the fixed parts.

This ſpice, at firſt brought over for dietetick uſes, has been long employed in the ſhops as a ſuccedaneum to the more coſtly oriental aromaticks; from them it was introduced into our hoſpitals, and is now received both in the London and Edinburgh Pharmacopæias. The college of London directs a ſimple water to be diſtilled from it, in the proportion of a gallon from half a pound: this is ſtrongly impregnated with the flavour of the pimenta, though it is leſs elegant than the ſpirituous water which the ſhops have been accuſtomed to prepare, by drawing off two or three gallons of proof ſpirit from the ſame quantity of the ſpice. The eſſential oil does not ſeem to be much known in practice; though it promiſes to be a very uſeful one, and might, doubtleſs, on many occaſions, ſupply the place of many of the dearer oils. The quantity of oil afforded by the ſpice is very conſiderable: Cartheuſer indeed ſays, that only about half a dram is to be got from 16 ounces; a miſtake, which probably has ariſen from inadvertence in copying Neumann's proportion, of half a dram from an ounce, or one ſixteenth: ſo large a proportion as this laſt cannot, however, be collected in its proper form, the oil that remains diſſolved in the diſtilled water being here included.

PIN, in commerce, a neceſſary implement for women's dreſs, which is very well known.

Pins are now altogether made of braſs-wire blanched, which formerly they made of iron-wire prepared in the ſame manner; but the ill effects of thoſe pins have quite diſcarded their uſe. The pins moſt eſteemed in commerce, are thoſe of England.

Pins *ſwallowed*, the cauſe of many grievous and dangerous effects, and it is preſumed often fatal; for upon inſpecting the entrails of patients, who appeared, ſymptomatically, to have died of the iliack-paſſion, colick, &c. they have been found to be killed by ſwallowing one or more pins, or needles, or the like.

In April (1777) a young woman, who had ſwallowed a very large pin, was brought to the hoſpital at Bambrough Caſtle, Northumberland, which ſtuck faſt in that part of the Œſophagus which enters into the thorax. As I had then the honour of the principal management of that Diſpenſary, I was ſent for, and found the patient in very great anguiſh. Having ſome time before thought much of the nature of this accident, and concluded, that if any thing could be given, that would paſs eaſily, and, when in the ſtomach, coagulate into a gloary maſs, it might probably bring up any thing ſticking in the gullet; I immediately gave her about four grains of the tartar emetick, diſſolved in water, and then made her ſwallow, ſeparately, the whites of ſix raw eggs; and in about two minutes after, ſhe vomited and brought up the coagulated maſs with the pin, which effectually relieved her.

A little time after, this method was attended with the like good ſucceſs, in an inſtance nearly ſimilar to the above. A maid ſervant of the honourable George Baillie, Eſq; of Mellerſtain, in Scotland, went to bed with twenty-four ſmall pins in her mouth; the conſequence of which was, that in the night the family was alarmed with her cries. Mr. Baillie ordered her to ſwallow the whites of eggs till ſhe vomited, and the whole number of pins came up, and are preſerved in the family as a curioſity.

Pin *and web*, a horny induration of the membranes of the eye.

Pin-*wheel of a clock*, the ſame with the ſtriking wheel. See Clock.

PINCHING, in gardening, a ſort of pruning performed by nipping off the branches of a plant or tree between the nails of two fingers.

Moſt gardeners hold that this contributes to the abundance of the fruit as well as branches, and that ſhoots thus lopped are leſs apt to grow black and die than otherwiſe. The ſeaſon for pinching is chiefly in April or May, ſometimes in June and July: it is chiefly practiſed on melons, cucumbers, &c. Quintinie alſo preſcribes it for fruit-trees. It is principally to be practiſed on the large branches towards the top, but rarely on the large ones below, which ought always to be pruned in winter, that they may yield others the following year. Nor muſt the operation of pinching be performed on the tender ſhoots, becauſe, having only juſt ſap enough for themſelves, when they come to put forth more branches in the place where they are pinched, the ſmall ſtock of ſap allotted them being divided, will ſtarve them. The operation is performed within two or three eyes of the branch they grow out of. By this means a vigorous tree will put forth two or three branches at the eye remaining; and the ſap being thus divided, the branches will be leſs, and therefore fit for wood and fruit.

PINDARICK, in poetry, an ode formed in imitation of the manner of Pindar. The Pindarick manner is diſtinguiſhed by the boldneſs and height of the flights, the ſuddenneſs and ſurpriſingneſs of the tranſitions, and the ſeeming irregularity, wildneſs, and enthuſiaſm of the whole. The only part remaining of Pindar's works, is a Book of Odes, all in praiſe of the victors at the Olympian, Pythian, Nemæan, and Iſthmian games: whence the

the firſt is intitled the Olympians; the ſecond, the Pythians; the third, the Nemæans; and the fourth, the Iſthmians.

PINE, *Pinus*, in botany, a genus of evergreen trees, the leaves of which come out of ſmall ſheaths, in pairs in ſome ſpecies, and in others by threes or fives; they are of a blueiſh green colour, and placed, for the moſt part, on every ſide of the branches; the flowers are male and female, growing on the ſame tree, and are both deſtitute of a corolla; the male flowers are collected in a bunch, and contain many ſtamina connected in a column at their baſe, but dividing at the top: the female flowers are collected in a common, almoſt oval cone, and ſtand at a diſtance from the male on the ſame tree, the ſcales of which are biflorous, oblong, imbricated, and perſiſtent, under which a ſmall germen is placed, ſupporting a ſubulated ſtyle, crowned with a ſingle ſtigma, which becomes an oblong oval nut, crowned with a membranaceous wing, and included in the rigid ſcale of the cone.

There are ſeveral ſpecies of pine-trees, which are raiſed for ſale in the nurſeries; but the moſt valuable are, what is commonly called the Scotch fir, and a North-American ſpecies, known among the gardeners here by the name of Lord Weymouth's pine, the former of which grows naturally on the mountains of Scotland, alſo in Denmark, Norway, and Sweden, the leaves of which grow out of a ſheath in pairs, which are twiſted, and are of a greyiſh colour: it will grow on almoſt any ſoil, and the timber of it is the moſt durable of any kind of pines yet known, the beſt yellow deals being the wood of this tree.

The Lord Weymouth's pine grows naturally in moſt parts of North America; it is one of the talleſt trees of all the ſpecies, often growing to 100 feet high in thoſe countries; the bark is very ſmooth, the leaves are long and ſlender, five growing out of each ſheath; the branches are pretty cloſely furniſhed with them, ſo makes a fine appearance; the cones are long, ſlender, and very looſe, opening with the firſt warmth of the ſpring; ſo that if they are not gathered in the winter, the ſeeds will be ſhed: the wood of this ſort is much eſteemed for making maſts for ſhips, &c. This ſort, and the Scotch pine, are the beſt worth cultivating of all the kinds, for the ſake of their valuable timber.

Pine-Apple, *Ananas*, in botany. See Ananas.

PINEAL Gland, in anatomy, a gland in the third ventricle of the brain; thus called from its reſemblance to a pine-apple. It is of a greyiſh colour, and its proceſſus and baſe are often medullary: this gland has often by many been ſuppoſed the peculiar ſeat of the ſoul.

PINGUICULA, butter-wort, in botany, a genus of plants, whoſe flower is monopetalous and ringent, the longer lip of which is ſtraight, obtuſe, trifid and ſupine; the ſhorter lip is bifid, more obtuſe, and ſpreading. This genus grows wild in boggy lands in divers parts of England.

PINION, in mechanicks, an arbor, or ſpindle, in the body whereof are ſeveral notches, that catch the teeth of a wheel that ſerves to turn it round: or it is a leſs wheel which plays in the teeth of a larger.

In a watch, &c. the notches of a pinion, which are commonly 4, 5, 6, 8, &c. are called leaves, and not teeth, as in other wheels.

PINK, in botany, the Engliſh name for ſeveral beautiful ſpecies of dianthus, much cultivated in our gardens; the principal of which are, the pheaſant's eye-pink, with double and ſingle flowers; the common red pink, the cob pink, Dobſon's pink, white cob pink, the painted lady pink, the China pink, &c. They are all propagated by ſlips, layers, or from ſeed.

The beſt time for planting the ſlips of pinks is in July or Auguſt, taking the opportunity of moiſt weather: the China or Indian pink is propagated from ſeeds, which ſhould be ſown upon a gentle hot-bed about the beginning of April, and in about three weeks or a month the plants will be up, and ſtout enough to remove; they ſhould then be taken up, with a ball of earth to their roots, and planted in a bed of rich mould, at about three inches aſunder, and in dry weather muſt be frequently watered; the further care is to keep them from being over-run with weeds, till June, at which time they may be tranſplanted to the place where they are deſigned to remain for flowering. If they are taken up with large balls to their roots (as before directed) they will not be injured by their removal; and as they grow not very large, it is beſt to plant them in beds, at about eight inches aſunder, where they will make a more beautiful appearance than intermixed with other flowers, there being a fine contraſt among theſe flowers, as ſcarce any two are marked alike; for no ſort of plant produces ſuch varieties of rich-coloured flowers as theſe do, which annually vary when raiſed from ſeeds.

PINNACLE, in architecture, the top or roof of a houſe, terminating in a point. This kind of roof, among the ancients, was appropriated to temples; their ordinary roofs were all flat, or made in the platform way. It was from the pinnacle that the form of the pediment took its riſe.

PINNATED Leaves, *Pinnata Folia*, in botany, thoſe which are compoſed of ſeveral folioles, or partial leaves, connected to the ſides of a petiole, in the form of wings. Of pinnated leaves there are ſeveral kinds, as, 1. The pinnated with an odd one, that is, when it is terminated with an odd foliole; 2. The cirrhoſe-pinnated leaf, when it is terminated with a tendril or claſper; 3. An abrupt-pinnated leaf, when it is terminated neither by a foliole or cirrhus; 4. The oppoſitely-pinnated, is when the folioles, or lobes, ſtand oppoſite on the mid-rib or petiole; 5. The alternately-pinnated, when the folioles are produced alternately; 6. The interruptedly-pinnated, when the folioles are alternately leſs; 7. The articulately-pinnated, when the petiole, common to all the folioles, is jointed; 8. The decurſively-pinnated, when the folioles run along the petiole from one to another; 9. The conjugate-pinnated, when the leaf conſiſts but of two folioles only on the petiole; 10. Bipinnate or duplicato-pinnated, when the foot-ſtalk is divided, and each diviſion ſuſtains ſeveral folioles ranged on their ſides like wings; 11. Triplicato-pinnate, expreſſes a leaf, the petioles of which ſend out three alated diviſions, before it has any folioles on it; theſe laſt are terminated ſometimes by two folioles each, and in that caſe are ſaid to be abrupt; ſometimes by an odd foliole, and are then called triplicato-pinnata cum impari.

PINNING, in building, the faſtening of tiles together, with pins of heart of oak, for the covering of a houſe, &c.

PINT, a veſſel, or meaſure, uſed in eſtimating the quantity of ſeveral ſorts of commodities; particularly liquids. See Measure.

PIPE, in building, &c. a canal for the conveyance of water, &c. Pipes for water engines are commonly of lead, iron, earth, or wood. Thoſe of iron are caſt, about two feet and a half long, ſeveral of which are pieced together by means of ſcrews, and leather or old hat between. Thoſe of earth are made by the potters, one end being wider than the other, in order to fit in; at the joinings they are covered with pitch and tow, and are uſually of the ſame length with the iron pipes; the wooden pipes, commonly alder, are bored with large iron augres ſucceeding one another from leſs to larger; the firſt being pointed, and the reſt formed like ſpoons, from one inch in diameter to ſix. Theſe are fitted into one another, and ſold by the foot. Leaden pipes are of two kinds; the one ſoldered, and the other not.

Pipe, in the manufactures, a machine much uſed in ſmoaking tobacco; it conſiſts of a long ſlender tube or ſhank which is hollowed, being made of clay baked; at one end is the bowl or furnace for the tobacco, the fumes whereof are drawn out by the mouth through the other end, and ſo diſcharged. Pipes are made long, ſhort, plain, worked, white, varniſhed, unvarniſhed, of various colours, &c.

The Turks uſe pipes three or four feet long, made of ruſhes or bored wood, at the end of which is a nut of baked earth for taking off and on.

Pipe, or *Butt*, alſo denotes a veſſel or meaſure for wine, and things meaſured by wine meaſure. It contains two hogſheads, or four barrels, or 126 gallons, and weighs about 900, two quarters, and 17 pounds. The pipe is only uſed in Anjou and Poictou, where it conſiſts of two boiſſeaux, equal to a muid and a half of Paris. See Measure.

Pipe, in law, a roll in the Exchequer, called likewiſe the great roll.

Pipe-*Office*, an office in the Exchequer wherein the clerk

clerk of the pipe makes out leafes of crown-lands by warrant from the treafury, or chancellor of the Exchequer. He alfo makes up all accounts of fheriffs, and gives the accomptants their quietus. To this office are brought all accounts which pafs the remembrancer's office, and remain there; that if any debt be due from any perfon, it may be drawn down into the great roll, upon which the comptroller of the pipe iffues out the fummons of the pipe for recovery thereof. And if there be no goods or chattels, the clerk draws down the debts to the lord treafurer's remembrancer to write eftreats againft their lands.

All tallies, vouching the payment of any fum contained in fuch accounts, are examined and allowed by the chief fecondary of the pipe. Befides the clerk and comptroller of the pipe, there are eight attornies or fworn clerks.

PIPPS, among florifts, are the diftinct flowers of fuch plants which grow in truffes or bunches, and is particularly applied to auriculas and polyanthufes.

PIQUETTES, among florifts, a kind of carnations; they have always a white ground, and fpotted or pounced with red, fcarlet, purple, or other colours. See the article CARNATION.

PIRATE, *Pyrate*, *Pirata*, rover; a perfon or veffel that robs on the high feas, makes defcents on the coaft, &c. without the authority of any prince or ftate.

When pirates are taken, they are ufually hanged, fometimes in the next port, fometimes on board the veffel that takes them, without either remiffion or formal trial.

They are denominated bucaneers, free-booters, &c. in the W. Indies, and corfairs in the Mediterranean.

PIROUETTE, PYROET, in the menage, a circumvolution which a horfe makes without changing his ground. A pirouette is of one tread or pifte, or of two; the firft is when upon one tread, and at the fame time, the horfe's head comes to the place where his tail was, without putting out his haunches; in the pirouette of two treads, he takes a compafs of ground about his own length, and marks both with the fore part and the hind.

PISCES, in aftronomy, the 12th conftellation of the zodiack; (fee *plate* IV. *fig.* 12.) and marked thus ♓ in books.

The ftars in Pifces, in Ptolemy's catalogue, are 38; in Tycho's, 33; and in the Britannick catalogue, 109.

PISCINA, in antiquity, a large bafon where the Roman youth learned to fwim, and which was encompaffed with a high wall, to prevent the cafting of filth into it.

PISCINA *Probatica*, a refervoir of water, near Solomon's temple, fo called from the Greek πρόβατον, fheep, becaufe here they wafhed the cattle deftined for facrifice.

Daviler obferves, there are ftill remaining five arches of the portico, and part of the bafon.

PISCINA, or lavatory, among the Turks, a large bafon in the middle of the court of a mofque, or under the porticos encompaffing it. It is ufually of an oblong figure built of ftone or marble, and furnifhed with a variety of cocks, wherein the Muffulman wafhes himfelf, before he offer his prayers, as being perfuaded that ablution effaces fin.

PISCIS VOLANS, in aftronomy, a fmall conftellation of the fouthern hemifphere, that was unknown to the ancients, being invifible.

PISSASPHALTUM, *Piffafphaltus*, in natural hiftory, denotes a liquid bitumen, refembling nothing fo much as common pitch, when a little foftened by the fire. It is of a very ftrong bituminous fmell, fomething like the fragrance of amber. It is foft enough to fpread on a marble, when frefh; but by degrees it becomes more and more hard, but never will arrive at the confiftence of the folid bitumens. It makes no effervefcence with acid menftruums, but is foluble in oil, and will impart a tincture to fpirit of wine, and give a ftrong tafte to water. The E. Indies, Perfia, and Egypt, abound with it, but it is no where fo plentiful as in Italy, particularly about Caftro, a town 60 miles from Rome, where it is found ouzing out of the cracks of the neighbouring rocks. The greateft quantity of what they gather is diftilled for its thin oil, which is fent into other parts of Europe under the name of petroleum; the reft is fent to the German fhops, where it is generally kept in its natural ftate.

There is alfo a factitious piffafphaltum, being a mixture of common pitch and the bitumen Judaicum.

PISSELÆUM, *Oleum Picinum*, oil of pitch, the watery part which fwims on pitch, which is feparated therefrom, while the pitch is in boiling, by fpreading over it clean wool, which, as foon as it is thoroughly moiftened with the afcending vapour, is wrung into a veffel; and this is repeated as long as the pitch is in boiling. It is effectual for the fame purpofes as tar.

PISSELÆUM *Indicum*, Barbadoes tar, in natural hiftory, a mineral fluid of the nature of the thicker fluid bitumens. It is a dufky-coloured matter, lefs vifcid than the piffafphaltum, and about the confiftence of treacle.

It is of a naufeous bitterifh tafte, and a very difagreeable fmell. It is foluble in oil, and is very frequent in America, where it is found trickling down the fides of the mountains in large quantities, and fometimes floating on the furface of the waters; but it feems to be almoft loft at this time in the country whence it was originally named. It has been greatly recommended internally in coughs and other diforders of the breaft and lungs, but is very feldom to be met with genuine any where.

PISTACHIA, the piftachia nut, in natural hiftory, a dry fruit of an oblong figure, pointed at both ends, having a double fhell. The kernel is like the pulp of an almond, fweet and very oily, but not without fome faint bitternefs. Piftachias were known to all the old writers. We have them from Syria, Perfia, Arabia, and the E. Indies; and they are very fuccefsfully cultivated in Italy and France, for the fake of their fruit. There are two kinds of them, a larger and a fmaller; the larger alone is fent to Europe; the fmaller are lefs common in the E. Indies than in Perfia, where they are however much more efteemed than the large ones, as being better flavoured. The tree that produces them is one of the diæcia pentandria of Linnæus, and of the arbores flore à fructu remoto of Ray. It is defcribed under the terebinthus Indica Theophrafti, and piftachia, or piftachia fructu ramofo.

Piftachias abound with a fweet well-tafted oil; they are wholefome and nutritive, and are very proper, by way of reftorative, eaten moderately, to people emaciated with long illneffes. They are recommended as peculiarly good to prevent obftructions of the liver, and are found of fervice in nephritick complaints. They are made ingredients in the electuarium diafatyrion, and the like; but thefe, as well as the piftachias, are now much out of ufe in medicine.

PISTE, in the menage, the track which a horfe makes upon the ground he goes over.

The pifte may be either fingle or double. If the rider makes the horfe go but an ordinary gallop, in a fquare he will make but a fingle pifte; if he gallop either with his haunches in, or go terra à terra, he will make two piftes, one with the fore part, another with the hind: and the fame if the rider make him paffage or go fideways, either in a ftraight line or on a circle.

PISTIL, among botanifts, denotes the female organ of generation in plants; it confifts of three parts, the germen, ftyle, and ftigma: the germen fupplies the place of an uterus in plants, and is of various fhapes, but always fituated at the bottom of the piftil, and contains the embryo-feeds: the ftyle is a part of various forms alfo, but always placed on the germen: and the ftigma is alfo of various figures, but always placed on the top of the ftyle, or, if that be wanting, on the top of the germen.

PISTOL, the fmalleft piece of fire-arms, borne at the faddle-bow, on the girdle, and in the pocket.

PISTOLE, a gold coin ftruck in Spain, and in feveral parts of Italy, Switzerland, &c.

The piftole has its augmentations and diminutions, which are quadruple piftoles, double piftoles, and half piftoles.

PISTON, *Embolus*, in pump-work, is a fhort cylinder of metal, or other folid fubftance, fitted exactly to the cavity of the barrel or body of the pump. See PUMP.

PITCH, a tenacious oily fubftance, drawn chiefly from pines and firs, and ufed in fhipping, medicine, and various other arts: or it is more properly tar, infpiffated by boiling it over a flow fire. See PINE.

Pitch acquires different names, according to its diffe-

tent

rent preparations, colours, and qualities: as it diftils from the wood, it is called barras; but afterwards it affumes a double name, the fineft and cleareft being called galipot, and the coarfer marbled barras. Of the galipot is made what is called white pitch, or Burgundy pitch, which is nothing but the galipot melted with oil of turpentine; though fome will have it a native pitch, diftilling from a refinous tree growing in the mountains of Franche Comté.

PITCHING, in naval affairs, the act of plunging or falling headlong into a fea, when the wave, by which the fhip's fore-part is lifted up, is fuddenly withdrawn from under the prow.

Pitching is often extremely dangerous to a veffel, as it ftrains both the hull and the mafts to a great degree, and frequently carries away the latter by a violent jerk.

PITH, in vegetation, the foft fpongy fubftance contained in the central parts of plants and trees. As the fubftance of the trunk in trees, fays Boerhaave, becomes more woody, the pith is compreffed, and ftraitened to fuch a degree, that it wholly difappears. It is plain from this, that the office of the pith, in vegetation, cannot be very great, fince it is not of perpetual duration. By its fpongy ftructure, it feems fitted to receive any fuperfluous moifture that might tranfude through the pores of the woody fibres. If by fuch moifture, or from any other caufe, it happens to rot and perifh, as frequently happens in elms, the tree is found to grow full as well without it; a proof it is of no effential ufe in vegetation.

PITUITARY GLAND, in anatomy, a gland in the brain, of the fize of a very large pea, placed under the cella of the os fphenoides, under the infundibulum, wherewith it communicates, receiving from it a lymph or a juice, which the infundibulum derives from the plexus choroides and pineal gland; and from this lympha does the gland itfelf take its name. It alfo filtrates a juice itfelf, feparating from the blood a white liquor, very fubtile, and apparently very fpirituous.

PIVAT, or PIVOT, a foot or fhoe of iron, or other metal, ufually conical, or terminating in a point, whereby a body, intended to turn round, bears on another fixed at reft, and performs its circumvolutions. The pivot ufually bears or turns round in a fole, or piece of iron or brafs, hollowed to receive it.

PLACARD, or PLACART, among foreigners, fignifies a leaf or fheet of paper, ftretched out, and applied on a wall or poft, containing edicts, regulations, &c. Among us, placard fignifies a licence, whereby a perfon is permitted to ufe unlawful games, &c.

PLACARD, in architecture, denotes the decoration of the door of an apartment, confifting of a chambranle, crowned with its frieze or gorge, and a corniche, fometimes fupported by confoles.

PLACE, *Locus*, in philofophy, a mode of fpace, or that part of immoveable fpace which any body poffeffes. See SPACE.

Optical PLACE, the point to which the eye refers an object.

PLACE *of Radiation*, is the fpace in a medium or tranfparent body, through which any vifible object radiates.

Excentrick PLACE *of a Planet*. See EXCENTRICK.

Geocentrick PLACE *of a Planet*. See GEOCENTRICK.

Heliocentrick PLACE *of a Planet*. See HELIOCENTRICK.

PLACE, in geometry. See LOCUS.

PLACE, in war, a general name for all kinds of fortreffes where a party may defend themfelves.

PLACE, in logick and oratory, denotes the feat or fource of an argument, of which there are two kinds, inartificial and artificial; the firft is the place of teftimony, authority, &c. the fecond that of reafon, as when we argue from univerfals, caufes, &c.

Common PLACE. See COMMON PLACE.

PLACENTA, in anatomy, a foft roundifh mafs, found in the womb of pregnant women; which, from its refemblance to the liver, was called by the ancients hepar uterinum, the uterine liver.

PLACÉNTA, is alfo a term ufed by fome botanifts, for what is more ufually called the receptacle of the feeds. See RECEPTACLE.

PLAFOND, or PLAFOUND, in architecture, the ceiling of a room, whether it be flat or arched, lined with plafter or joiner's work, and frequently enriched with painting. The word plafond is alfo more particularly ufed for the bottom of the projecture of the larmier of the corniche, calledalfo foffita. See SOFFITA.

PLAGIARY, one that fteals from another fome fentence or point of doctrine without naming the author.

PLAGUE, *Peftis*, in phyfick, is one of the moft acute kind of fevers, arifing from a poifonous miafma, brought from the eaftern countries, &c. which proves mortal, unlefs, by the vigour of the vital motions, the poifon is foon carried off by means of buboes and carbuncles.

The plague differs from other fevers of the contagious, malignant, and exanthematous kind, in this, that it is, of all others, the moft acute, fince it fometimes deftroys the patient on the firft or fecond day of its attack. In Europe the plague is neither epidemick, nor fporadick, arifing from a prepofterous method of living, or an infalutary conftitution of the air; but, in our healthy parts of the world, draws its origin from a contagion derived from the fultry and before infected eaftern climes. A plague, alfo, has this peculiar to it, that it is not, like other malignant and putrid fevers, terminated by large fweats, fluxes, or other excretions; but the poifon being, in a critical and falutary manner, forced to the external glandular parts, it is terminated by tumours, which end in abfceffes. Befides, contrary to what happens in other contagious and petechial fevers, fuch is the fubtile quality of the peftilential poifon, that it quickly adheres to porous fubftances, and, without any diminution of its force, may be conveyed to countries many thoufand miles diftant from each other. It is alfo peculiar to this contagion, that its malignant and fpreading nature is not only checked, but alfo totally extinguifhed by intenfe cold. Hence it happens, that in cold weather, and cold climates, a plague is rarely or never obferved, whereas it rages frequently and violently in hot and fultry climates.

But as, in all contagious and malignant fevers, the poifonous miafma, taken in with the air, infinuates itfelf into the fermentable faliva, and exerts its baleful influence on the parts through which it paffes; fo this, in a particular manner, holds true, concerning the peftilential contagion, which, immediately attacking the head, brain, nerves, and nervous fluid, excites a torpor of the head, a fenfe of weight, drowfinefs, an exceffive pain, a ftupor of the fenfes, forgetfulnefs of every thing, reftleffnefs, watching, and a lofs of ftrength. When this peftilential contagion, being conveyed through the fauces to the ftomach, excites a loathing of food, naufeous uneafinefs of the præcordia, a fymptomatick cardialgia, efforts to vomit, and actual vomiting; then being conveyed to the membranes of the fpinal marrow, and the nervous coats of their arteries, it not only produces an horror, and a languid, fmall, contracted and frequent pulfe, but alfo deliquiums. All thefe are the ordinary fymptoms of a beginning plague, and are fo much the more violent and quick in their operation, as the peftilential poifon exceeds that of other contagious and malignant diforders.

Since it is certain the plague is not originally generated in Europe, but is imported from other countries, there can be no more fafe and infallible advice given, than to fly from the contagion.

All perfons, when the plague rifes, ought to live very temperately, and every degree of excefs is to be avoided in the non-naturals, efpecially with refpect to the paffions of the mind; and all thefe things are to be abftained from which impair the ftrength, difturb perfpiration, and generate crudities in the primæ viæ.

In the cure of a plague the following intentions are to be purfued: 1. To promote the expulfion of the received miafma in a proper manner, efpecially by thefe critical tumours, which are to be duly managed. And, 2. To roufe and fupport the languid ftrength, which is of fo great importance to life; and to remove, or relieve the moft urgent fymptoms.

In the cure of all difeafes, it is to be laid down as a maxim, that, if for fome of the firft days of the diforder, few or no fæces are eliminated, the body is to be rendered foluble by a gentle clyfter, that, by this means, the inteftines may be freed from the excrements, left otherwife the fymptoms fhould be increafed, and the efficacy of the medicines obtunded. Langius is alfo

greatly to be recommended for uſing an alexipharmick, in order to excite a ſweat for ſome hours, ſince, by this means, the poiſon is more expeditiouſly exhaled and diſſipated. The application of an epithem to the heart is alſo a circumſtance of great importance; for though it does not immediately touch and affect the heart, but only the right orifice of the ſtomach, and its nervous and muſcular coats, yet it is of the laſt importance, that the ſtomach, which is an highly nervous part, of exquiſite ſenſation, has an intimate communication with the nervous parts of the whole body, and in which the poiſon firſt exerts its virulent influence, ſhould be well defended; which intention is anſwered by ſuch medicines as are antiſpaſmodick, and at the ſame time corroborative and balſamick; and, after the uſe of alexipharmicks, the opening of a vein is alſo highly beneficial.

Plague-*Water*, *Aqua epidemica*, is one of the compound waters of the ſhops.

PLAIN, *Planus*, denotes in general any thing ſmooth, even, or obvious, and ſo ſtands oppoſed to rough, laboured, and enriched.

Plain *Figure*, in geometry, is an uniform ſurface, from every point of whoſe perimeter right-lines may be drawn to every other point in the ſame.

Plain *Angle*, is an angle contained under two lines, or ſurfaces, in contradiſtinction to a ſolid angle.

Plain *Triangle*, is a triangle included under three right lines, or ſurfaces, in oppoſition to a ſpherical and mixed triangle.

Plain *Trigonometry*, is the doctrine of plain triangles, their meaſures, proportions, &c. See Trigonometry.

Plain *Glaſs*, or *Mirrour*, in opticks, is a glaſs whoſe ſurface is flat or even, commonly called a looking-glaſs.

Plain *Sailing*. See Sailing.

Plain *Scale*. See Scale.

Plain *Table*, in geometry, &c. an inſtrument uſed in the ſurveying of lands, whereby the plan is taken on the ſpot, without any future protraction.

The table itſelf is a parallelogram of oak, or other wood (*plate* LXIV. *fig.* 9.) about 15 inches long, and 12 broad, conſiſting of two ſeveral boards, round which are ledges of the ſame wood; the two oppoſite of which being taken off, and the ſpangle unſcrewed from the bottom, the aforeſaid two boards may be taken aſunder for eaſe and conveniency of carriage. For the binding of the two boards and ledges faſt, when the table is ſet together, there is a box-jointed frame, about three quarters of an inch broad, and of the ſame thickneſs as the boards, which may be folded together in ſix pieces. This frame is ſo contrived, that it may be taken off and put on the table at pleaſure, and may go eaſily on the table, either ſide being upwards. This frame alſo is to faſten a ſheet of paper upon the table, by forcing down the frame, and ſqueezing in all the edges of the paper; ſo that it lies firm and even upon the table, that thereby the plot of a field, or other incloſure, may conveniently be drawn upon it.

On both ſides this frame, near the inward edge, are ſcales of inches ſubdivided into ten equal parts, having their proper figures ſet to them. The uſes of theſe ſcales of inches are for ready drawing of parallel lines upon the paper; and alſo for ſhifting your paper, where one ſheet will not hold the whole work.

Upon one ſide of the ſaid box-frame are projected the 360 degrees of a circle, from a braſs centre-hole in the middle of the table. Each of theſe degrees are ſubdivided into 30 minutes; to every 10th degree are ſet two numbers, one expreſſing the proper numbers of degrees, and the other the complement of that number of degrees to 360. This is done to avoid the trouble of ſubtraction in taking of angles.

On the other ſide of this frame are projected the 180 degrees of a ſemi-circle from a braſs centre-hole, in the middle of the table's length, and about a fourth part of its breadth. Each of theſe degrees is ſubdivided into 30 minutes; to every 10th degree are ſet likewiſe, as on the other ſide, two numbers; one expreſſing the proper number of degrees, and the other the complement of that number of degrees to 180, for the ſame reaſon as before.

The manner of projecting the degrees on the aforeſaid frame is, by having a large circle divided into degrees, and every 30 minutes; for then placing either of the braſs centre-holes on the table, in the centre of that circle ſo divided, and laying a ruler from that centre to the degrees on the limb of the circle; where the edge of the ruler cuts the frame, make marks for the correſpondent degrees on the frame.

The degrees, thus inſerted on the frame, are of excellent uſe in wet or ſtormy weather, when you cannot keep a ſheet of paper upon the table. Alſo, theſe degrees will make the plain-table a theodolite, or a ſemi-circle, according as what ſide of the frame is uppermoſt.

There is a box, with a needle and card, covered with a glaſs, fixed to one of the long ſides of the table, by means of a ſcrew, that thereby it may be taken off. This box and needle is very uſeful for placing the inſtrument in the ſame poſition upon every remove.

There belongs to this inſtrument a braſs ſocket and ſpangle, ſcrewed with three ſcrews to the bottom of the table, into which muſt be put the head of the three-legged ſtaff, which may be ſcrewed faſt, by means of a ſcrew in the ſide of the ſocket.

There is alſo an index belonging to the table, which is a large braſs ruler, at leaſt 16 inches long, and two inches broad, and ſo thick as to make it ſtrong and firm, having a ſloped edge, called the fiducial edge, and two ſights ſcrewed perpendicularly on it, of the ſame height. They muſt be ſet on the ruler perfectly at the ſame diſtance from the fiducial edge. Upon this index it is uſual to have many ſcales of equal parts, as alſo diagonals, and lines of chords.

When you would make your table fit for uſe, lay the two boards together, and alſo the ledges at the ends in their due places, according as they are marked. Then lay a ſheet of white paper all over the table, which muſt be ſtretched over the boards, by putting on the box-frame, which binds both the paper to the boards, and the boards to one another: then ſcrew the ſocket on the back ſide the table, and alſo the box and needle in its due place, the meridian line of the card lying parallel to the meridian or diameter of the table; which diameter is a right line drawn upon the table, from the beginning of the degrees through the centre, and ſo to the end of the degrees. Then put the ſocket upon the head of the ſtaff, and there ſcrew it: alſo put the ſights upon the index, and lay the index on the table. So is your inſtrument prepared for uſe, as a plain-table, theodolite, or ſemi-circle.

But note, it is either a theodolite, or ſemi-circle, according as the theodolite or ſemi-circle ſide of the frame is upwards; for, when you uſe your inſtrument as a plain-table, you may place your centre in any part of the table, which you judge moſt proper for bringing on the work you intend. But, if you uſe your inſtrument as a theodolite, the index muſt be turned about upon the braſs centre-hole in the middle of the table; and, if for a ſemi-circle, upon the other braſs centre-hole, by means of a pin or needle placed therein.

If you have a mind to uſe this inſtrument as a circumferentor, you need only ſcrew the box and needle to the index, and both of them to the head of the ſtaff, with a braſs ſcrew-pin fitted for that purpoſe: ſo that, the ſtaff being fixed in any place, the index and ſights may turn about at pleaſure, without moving the ſtaff.

1. *How to obſerve an angle in the field by the* Plain-*table*.

Suppoſe E, K, KG, (*plate* LXIV. *fig.* 10.) to be two hedges, or two ſides of a field, including the angle EKG, and it is required to draw upon the table an angle equal thereto: firſt, place your inſtrument as near the angular point K as conveniency will permit, turning it about, till the north end of the needle hangs directly over the meridian line in the card, and then ſcrew the table faſt. Then upon your table, with your protracting-pin (which is a fine needle put into a piece of box or ivory, neatly turned) or compaſs-point, aſſign any point at pleaſure upon the table, and to that point apply the edge of the index, turning the index about upon that point, till through the ſights thereof you ſee a mark ſet up at E, or parallel to the line EK: and then, with your protracting-pin, compaſs-point, or pencil, draw a line by the ſide of the index to the aſſigned point upon the table. Then (the table remaining immoveable) turn the index about upon the forementioned point, and direct the ſights to the mark ſet up at G, or parallel thereto, that is, ſo far diſtant from G, as your inſtrument is placed from K; and then by the ſide of the index draw another line to the aſſigned point. Thus will there be

drawn

drawn upon the table two lines repreſenting the hedges E K and K G, and which include an angle equal to the angle E K G. And, though you know not the quantity of this angle, yet you may find it, if required: for, in working by this inſtrument, it is ſufficient only to give the proportions of angles, and not their quantities in degrees, as in working by the theodolite, ſemi-circle, or circumferentor. Alſo in working by the plain-table, there needs no protraction at all, for you will have upon your table the true figure of any angle or angles that you obſerve in the field, in their true poſitions, without any further trouble.

2. *How to find the quantity of an angle in the field, by the* PLAIN-*table, conſidered as a theodolite or ſemi-circle.*

Let it firſt be required to find the quantity of the angle E K G (*plate* LXIV. *fig.* 10.) by the plain-table, as a theodolite: place your inſtrument at K, with the theodolite ſide of the frame upwards, laying the index upon the diameter thereof; then turn the whole inſtrument about (the index ſtill reſting upon the diameter) till through the ſights you eſpy the mark at E: then ſcrewing the inſtrument faſt there, turn the index about upon the theodolite centre-hole in the middle of the table, till through the ſights you eſpy the mark at G. Then note what degrees on the frame of the table are cut by the index, and thoſe will be the quantity of the angle E K G ſought.

You muſt proceed in the ſame manner for finding the quantity of an angle, by the plain-table, as a ſemi-circle; only put the ſemi-circle ſide of the frame upwards, and move the index upon the other centre-hole.

3. *How, by the* PLAIN-*table, to take the plot of a field at one ſtation within the ſame, from whence all the angles of the ſame field may be ſeen.*

Having entered upon the field to ſurvey, your firſt work muſt be to ſet up ſome viſible mark at each angle thereof; which being done, make choice of ſome convenient place about the middle of the field, from whence all the marks may be ſeen, and there place your table, covered with a ſheet of paper, with the needle hanging over the meridian line of the card, which you muſt always have regard to, eſpecially when you are to ſurvey many fields together. Then make a mark about the middle of the paper, to repreſent that part of the field where the table ſtands; and, laying the index upon this point, direct your ſights to the ſeveral angles where you before placed marks, and draw lines by the ſide of the index upon the paper. Then meaſure the diſtance of every of theſe marks from your table, and by your ſcale ſet the ſame diſtances upon the lines drawn upon the table, making ſmall marks with your protracting-pin, or compaſs-point, at the end of each of them. Then lines being drawn from the one to the other of theſe points, will give you the exact plot of the field; all the lines and angles upon the table being proportional to thoſe of the field.

Example. Suppoſe the plot of the field A B C D E F (*fig.* 11.) was to be taken. Having placed marks in the ſeveral angles thereof, make choice of ſome proper place about the middle of the field, as at L, from whence you may behold all the marks before placed in the ſeveral angles, and there place your table. Then turn your inſtrument about, till the needle hangs over the meridian line of the card, denoted by the line N S.

Your table being thus placed with a ſheet of paper thereon, make a mark about the middle of your table, which ſhall repreſent the place where your table ſtands. Then, applying your index to this point, direct the ſights to the firſt mark at A, and, the index reſting there, draw a line by the ſide thereof to the point L. Then with your chain meaſure the diſtance from L, the place where your table ſtands, to A, the firſt mark, which ſuppoſe 8 chains 10 links. Then take 8 chains 10 links from any ſcale, and ſet that diſtance upon the line from L to A.

Then directing the ſights to B, draw a line by the ſide of the index, as before, and meaſure the diſtance from your table at L, to the mark at B, which ſuppoſe 8 chains 75 links. This diſtance taken from your ſcale, and applied to your table from L to B, will give the point B, repreſenting the ſecond mark. Then direct the ſights to the third mark C, and draw a line by the ſide of the index, meaſuring the diſtance from L to C, which ſuppoſe 10 chains 65 links. This diſtance being taken from your ſcale, and applied to your table from L to C, will give you the point C, repreſenting the third mark.

In this manner you muſt deal with the reſt of the marks at D, E, and F, and more if the field had conſiſted of more ſides and angles. Laſtly, when you have made obſervations of all the marks round the field, and found the points A B C D E and F upon your table, you muſt draw lines from one point to another, till you conclude where you firſt begun. As, draw a line from A to B, from B to C, from C to D, from D to E, from E to F, and from F to A, where you begun; then will A B C D E F be the exact figure of your field, and the line N S the meridian.

Note, Our chains are commonly four poles in length, and are divided into 100 equal parts, called links, at every 10th of which are braſs diſtinctions numbering them.

4. *To take the plot of a wood, park, or other large champaign plain, by the* PLAIN-*table, in meaſuring round the ſame.*

Suppoſe A B C D E F G (*plate* LXIV. *fig.* 12.) to be a large wood, whoſe plot you deſire to take upon the plain-table.

Having put a ſheet of paper upon the table, place your inſtrument at the angle A, and direct your ſights to the next angle at B, and by the ſide thereof draw a line upon your table, as the line A B. Then meaſure by the hedge-ſide from the angle A to the angle B, which ſuppoſe 12 chains 5 links. Then from your ſcale take 12 chains 5 links, and lay off upon your table from A to B. Then turn the index about, and direct the ſights to G, and draw the line A G upon the table. But at preſent you need not meaſure the diſtance.

Remove your inſtrument from A, and ſet up a mark where it laſt ſtood, and place your inſtrument at the ſecond angle B. Then laying the index upon the line A B, turn the whole inſtrument about, till through the ſights you ſee the mark ſet up at A, and there ſcrew the inſtrument. Then laying the index upon the point B, direct your ſights to the angle C, and draw the line B C upon your table. Then meaſuring the diſtance B C, 4 chains 45 links, take that diſtance from your ſcale, and ſet it upon your table from B to C.

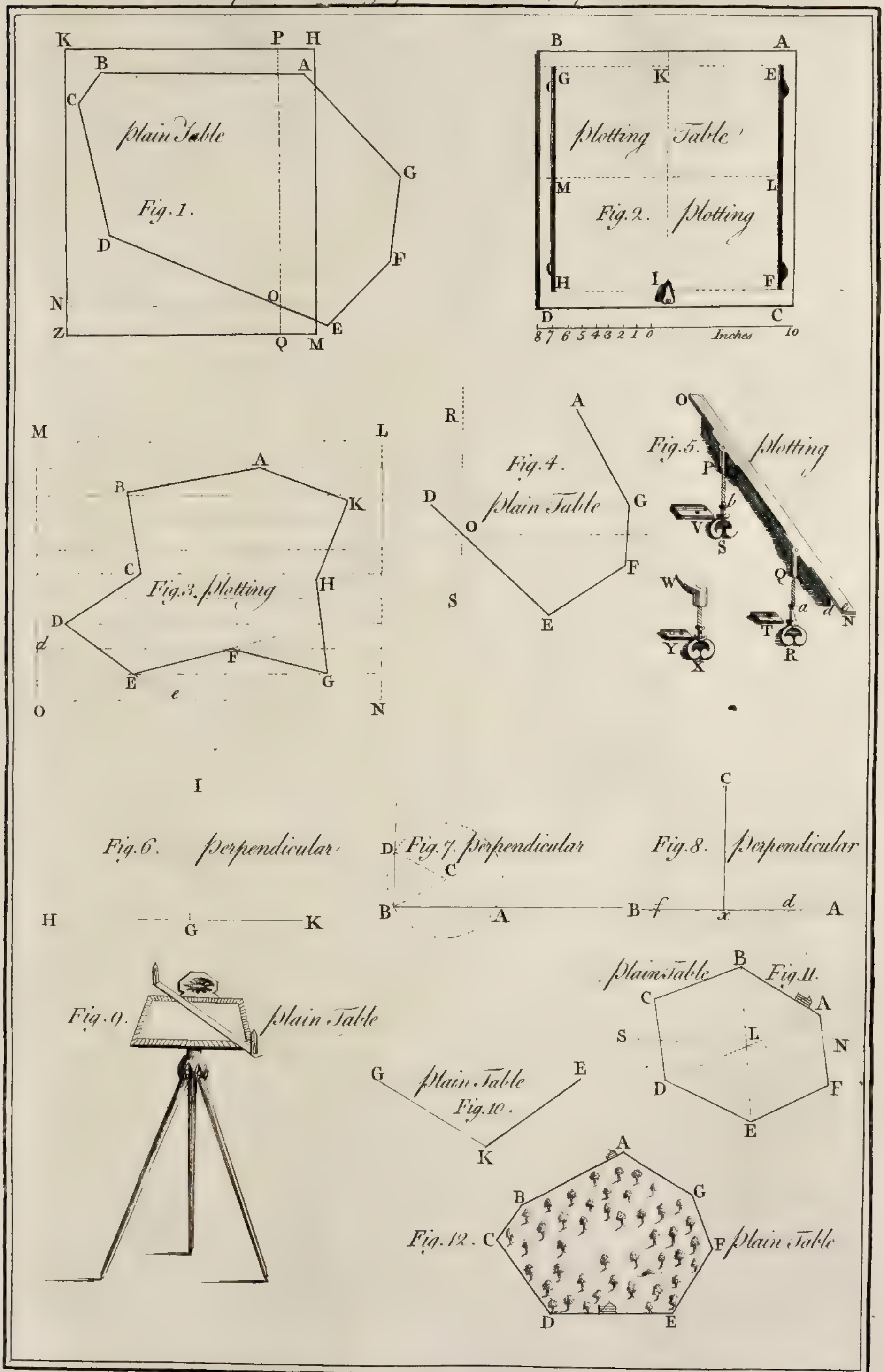
Remove your inſtrument from B, and ſet up a mark in the room of it, and place your inſtrument at C, laying the index upon the line C B; and turn the whole inſtrument about, till through the ſights you eſpy the mark ſet up at B, and there faſten the inſtrument. Then laying the index upon the point C, direct the ſights to D, and draw upon the table the line C D. Then meaſure from C to D, 8 chains 85 links, and ſet that diſtance upon your table from C to D.

Remove the inſtrument to D (placing a mark at C, where it laſt ſtood) and lay the index upon the line D C, turning the whole inſtrument about, till through the ſights you ſee the mark at C, and there faſten the inſtrument. Then lay the index on the point D, and direct the ſights to E, and draw the line D E. Then with your chain meaſure the diſtance D E, 13 chains 4 links, which lay off on the table from D to E.

Remove your inſtrument to E (placing a mark at D, where it laſt ſtood) and, laying the index upon the line D E, turn the whole inſtrument about, till through the ſights you ſee the mark at D, and there faſten the inſtrument. Then lay the index on the point E, and direct the ſights to F, and draw the line E F. Then meaſure the diſtance E F, 7 chains 70 links, which take from your ſcale, and lay off from E to F.

Remove your inſtrument to F (placing a mark at E, where it laſt ſtood) and lay the index upon the line E F, turning the inſtrument about, till you ſee the mark ſet up at E, and there faſten the inſtrument. Then laying the index on the point F, direct the ſights to G, and draw the line F G upon the table, which line F G will cut the line A G in the point G. Then meaſure the diſtance F G, 5 chains 67 links, and lay it off from F to G.

Remove your inſtrument to G (ſetting a mark where it laſt ſtood) and lay the index upon the line F G, turning the whole inſtrument about, till through the ſights you ſee the mark at F, and there faſten the inſtrument. Then laying the index upon the point G, direct the ſights


plain Table
Fig. 1.
K P H B A C G D F N O Z Q M E
plotting Table
Fig. 2. plotting
B A G K E M L H I F D C
8 7 6 5 4 3 2 1 0 Inches 10
Fig. 3. plotting
M L A B K C H D F E G O N d e
Fig. 4.
plain Table
R A D G O F S E
Fig. 5. plotting
O P b V S W Q T a d N Y X R
I
Fig. 6. perpendicular
H G K
D Fig. 7. perpendicular
C B A
Fig. 8. perpendicular
C B f x d A
Fig. 9. plain Table
plain Table
Fig. 10.
G E K
plain Table
Fig. 11.
B C A S L N D F E
Fig. 12. plain Table
A B G C F D E

fights to A (your firft mark) and draw the line G A, which, if you have truly wrought, will pafs directly through the point A, where you firft began.

In this manner you may take the plot of any champaign plain, be it never fo large. And here note, that very often hedges are of fuch a thicknefs, that you cannot come near the fides or angles of the field, either to place your inftrument, or meafure the lines. Therefore, in fuch cafes you muft place your inftrument, or meafure the lines, parallel to the fide thereof; and then your work will be the fame as if you meafured the hedge itfelf.

Note alfo, that, in thus going about the field you may much help yourfelf by the needle. For looking what degree of the card the needle cuts at one ftation, if you remove your inftrument to the next ftation, and with your fights look to the mark where the inftrument laft ftood, you will find the needle to cut the fame degree again, which will give you no fmall fatisfaction in the profecution of your work. And, though there be a hundred or more fides, the needle will ftill cut the fame degree at all of them, except you have committed fome former error: therefore, at every ftation have an eye to the needle.

5. *Of fhifting of paper.*

In taking the plot of a field by the plain-table, and going about the fame, as before directed, it may fo fall out, if the field be very large, and when you are to take many inclofures together, that the fheet of paper upon the table will not hold all the work; but you muft be forced to take off that fheet, and put another clean fheet in the room thereof: and, in plotting of a manor or lordfhip, many fheets may be thus changed, which we call fhifting of paper. The manner of performing thereof is as follows:

Suppofe in going about to take the plot A B C D E F G (*plate* LXIV. *fig.* 1.) as before directed, that having made choice of the angle at A for the place of the beginning, and proceeded from thence to B, and from B to C, and from C to D, when you come to the angle at D, and are to draw D E, you want room to draw the fame upon the table; do thus:

Firft through the point D draw the line D O, which is almoft fo much of the line D E, as the table will contain. Then near the edge of the table H M, draw a line parallel to H M, by means of the inches and fubdivifions on the oppofite fides of the frame, as P Q, and another line at right angles to that through the point O, as O N. This being done, mark this fheet of paper, with the figure (1) about the middle thereof, for the firft fheet. Then, taking this fheet off your table, put another clean fheet thereon, and draw upon it a line parallel to the contrary edge of the table, as the line R S (*fig.* 4.) Then, taking your firft fheet of paper, lay it upon the table fo, that the line P Q may exactly lie upon the line R S, to the beft advantage, as at the point O (*fig.* 4.) Then with the point of your compaffes draw fo much of the line O D, upon the clean fheet of paper, as the table will hold. Having thus done, proceed with your work upon the new fheet, beginning at the point O; and fo going forward with your work, as in all refpects has been before directed; as from O to E, from E to F, from F to G, and from G to A (by this direction) fhifting your paper as often as you have occafion.

Under the article Plotting, the reader will find a method of taking any furvey without the trouble of fhifting paper.

Plain *Number*, is a number that may be produced by the multiplication of two numbers into one another. Thus 20 is a plain number produced by the multiplication of 5 into 4.

Plain *Place, locus planus*, or *locus ad planum*, among the ancient geometricians denoted a geometrical locus, when it was a right line or a circle, in oppofition to a folid place, which was an ellipfis, parabola, or hyperbola. Thefe the moderns diftinguifh into loci ad rectam, and loci ad circulum.

Plain *Problem*, in mathematicks, is fuch a problem as cannot be folved geometrically, but by the interfection either of a right line and a circle, or of the circumferences of two circles; as, given the greateft fide, and the fum of the other two fides of a right-angled triangle, to find the triangle; as alfo to defcribe a trapezium that fhall make a given area of four given lines. Such problems can only have two folutions, in regard a right line can only cut a circle, or one circle cut another in two points.

Plain, in heraldry, fometimes denotes the point of the fhield, when couped fquare; a part remaining under the fquare, of a different colour or metal from the fhield. This has been fometimes ufed as a mark of baftardy, and called champaigne; for, when the legitimate defcendants of baftards have taken away the bar, fillet, or traverfe borne by their fathers, they are to cut the point of the fhield with a different colour called plain.

PLAINT, in law, the exhibiting any action, real or perfonal, in writing.

PLAINTIFF, in law, a perfon who fues or complains in an affize or action perfonal, as of debt, trefpafs, deceit, detenue, &c. Plaintiff ftands oppofed to defendant.

PLAISE, the Englifh name of a fpecies of the pleuronectes, with fmooth fides, a fpine near the anus, and the eyes and fix tubercles placed on the right fide of the head: it is fomewhat larger than the flounder.

PLAISTER, or Plaster. See Plaster.

PLAN, in general, denotes the reprefentation of fomething drawn on a plane: fuch are maps, charts, ichnographies, &c.

The term plan, however, is particularly ufed for a draught of a building, fuch as it appears, or is intended to appear, on the ground; fhewing the extent, divifion, and diftribution of its area, or ground-plot, into apartments, rooms, paffages, &c.

A geometrical plan is that, wherein the folid and vacant parts are reprefented in their natural proportions. The raifed plan of a building is the fame with what is otherwife called an elevation or orthography.

A perfpective plan is that exhibited by degradations, or diminutions, according to the rules of perfpective. See Perspective.

To render plans intelligible, it is ufual to diftinguifh the maffives with a black wafh; the projectures on the ground are drawn in full lines, and thofe fuppofed over them in dotted lines. The augmentations, or alterations, to be made, are diftinguifhed by a colour different from what is already built; and the tints of each plan made lighter, as the ftories are raifed. In large buildings, it is ufual to have three feveral plans, for the three firft ftories.

PLANCHIER, or Plancere, in architecture, the under part of the corona, or drip, making the fuperior part of the corniche, between two cymatiums.

PLANE, *Planum*, in geometry, denotes a plain furface, or one that lies evenly between its bounding lines: and as a right line is the fhorteft extenfion from one point to another, fo a plane furface is the fhorteft extenfion from one line to another.

In aftronomy, conicks, &c. the term plane is frequently ufed for an imaginary furface, fuppofed to cut and pafs through folid bodies; and on this foundation, is the whole doctrine of conick fections built.

In mechanicks, planes are either horizontal, that is, parallel to the horizon, or inclined thereto.

The determining how far any given plane deviates from an horizontal one, makes the whole bufinefs of levelling.

In opticks, the planes of reflection and refraction are thofe drawn through the incident and reflected or refracted rays.

The plane of the horopter is that drawn through the horopter, perpendicularly to the plane of the two optical axes. See Horopter.

In perfpective, we meet with the perfpective plane, which is fuppofed to be pellucid, and perpendicular to the horizon; the horizon plane, fuppofed to pafs through the fpectator's eye, parallel to the horizon; the geometrical plane, likewife parallel to the horizon, whereon the object to be reprefented is fuppofed to be placed, &c.

The plane of projection, in the ftereographick projection of the fphere, is that on which the projection is made; correfponding to the perfpective plane.

Plane, in joinery, an edge-tool to fhave wood fmooth and even. It confifts of a wooden ftock, very fmooth at bottom, in the middle of which is an aperture, through which paffes a fteel edge very fharp, that takes off

off the inequalities of the wood on which it is slid along. It has various names according to its forms, sizes, and uses.

PLANET, *Planeta*, in astronomy, a celestial body revolving round the sun as a centre, and changing its position with respect to the fixed stars. The planets are usually distinguished into primary and secondary.

Primary PLANETS, are those which move round the sun as a centre, and these, by way of eminence, are usually called planets.

Secondary PLANETS, or satellites, are such as move round some primary planet, as their respective centre, in the same manner as the primary planets do round the sun.

The primary planets are six in number, viz. Saturn, Jupiter, Mars, the Earth, Venus, and Mercury. Of these the first three are called superior planets, because their orbits circumscribe that of the earth; and the two last inferior planets, because their orbits are circumscribed by the orbit of the earth. See the order, position, magnitude, &c. of the planets, represented on the orrery, (*plate* LXI. *fig.* 1.)

From the several phases and appearances of the planets, they are found to be all perfectly like the moon, that is, opake bodies, and borrow all their light from the sun.

This will plainly appear from the following particulars: 1. Venus, observed with a telescope, is rarely found full, but with variable phases like those of the moon, her illuminated part still turned towards the east, when she is the morning star, and west, when the evening star. And the like phases have been observed of Mars and Mercury.

2. Gassendus first, and after him others, have observed Mercury on the face of the sun, a-cross which he appeared to pass like a black round spot. Horrox, in 1639, also observed Venus in the sun, where she made the same appearance.

3. De la Hire, in 1700, with a telescope of 16 feet, discovered mountains in Venus, larger than those of the moon.

4. Cassini observed two spots in Venus; four in Mars, likewise observed by Campani; and several, at several times, in Jupiter: and from his observations of these spots, found that they had a rotation round their axes: he even determined the velocity of that rotation, or the period wherein it was effected, v. gr. that of Jupiter, 9 hours 56'. That of Mars, 24 hours 40'. And that of Venus, 24 hours. And since the sun, moon, Jupiter, Mars, Venus, and the Earth, are found to revolve on their axes, i. e. to have a diurnal rotation: no doubt Mercury and Saturn have the same; though the great nearness of the former to the sun, and the great distance of the latter, prevent any spots from being observed on them, whence that rotation might be demonstrated.

5. In Jupiter are observed two swaths, or belts, brighter than the rest of his disk, and moveable; sometimes found in one part, sometimes in another; sometimes broader, sometimes narrower.

6. In 1609, were first observed three little stars, or moons moving about Jupiter, by Sim. Marius; and in 1610, the same was observed by Galileo: these are now frequently observed to disappear in a clear sky, when Jupiter happens to be diametrically interposed between them and the sun. Whence it appears they are void of light, at such time when the sun's rays, intercepted by Jupiter, cannot be propagated to them in right lines; and hence also, that, like the moon, they are opaque bodies, illuminated by the sun; and hence again, since Jupiter does not illuminate his satellites when placed behind him, he himself, in that part turned from the sun, may be argued to be void of light.

7. When Jupiter's moons are diametrically interposed between Jupiter and the sun, there is seen a round spot on Jupiter's disk, which is sometimes larger than the satellite itself. Whence it appears, that the satellites are opaque bodies, illuminated by the sun; that they project a shadow upon the planet, and that the round spots seen in Jupiter are the shadows of the satellites. Whence also, the intersection of that shadow being found to be a circle, the shadow must be conical; and therefore the figure of the satellites, at least as to sense, is spherical.

8. The earth being between Jupiter and the sun, if, at the same time, any of the satellites happen to be between Jupiter and the sun, it is lost in Jupiter's light, though sometimes appearing like a black spot. This phænomenon has been frequently observed by Cassini and Maraldi, who have likewise noted very considerable alterations in the apparent magnitudes of the satellites; for which no reason could be given from the distance of Jupiter, the sun, or the earth: e. gr. that the fourth, which is usually seen the smallest, is sometimes the largest, and the third, which is usually the largest, sometimes the smallest. Hence, as the satellites are illuminated by the sun, even then when immerged in Jupiter's light, yet appear obscure, there must be some alteration in their atmospheres, to prevent the sun's rays being equally reflected from every part of their surface; which must likewise be the cause why their shadow is sometimes larger than themselves.

Now, to sum up the evidence. 1. Since in Venus, Mercury, and Mars, only that part of the disk illuminated by the sun is found to shine; and, again, Venus and Mercury, when between the earth and the sun, appear like dark spots or maculæ on the sun's disk; it is evident, that Mars, Jupiter, and Mercury, are opaque bodies, illuminated with the borrowed light of the sun. And the same appears of Jupiter, from its being void of light in that part to which the shadow of the satellites reaches, as well as in that part turned from the sun; and that his satellites are opaque, and reflect the sun's light, is abundantly shewn. Wherefore, since Saturn, with his ring and satellites, only yield a faint light, fainter considerably than that of the fixed stars, though these be vastly more remote; and than that of the rest of the planets: it is past doubt, he too, with his attendants, are opaque bodies.

2. Since the sun's light is not transmitted through Mercury and Venus, when placed against him, it is plain they are dense opaque bodies; which is likewise evident of Jupiter, from his hiding the satellites in his shadow; and therefore, by analogy, the same may be concluded of Saturn.

3. From the variable spots in Venus, Mars, and Jupiter, it is evident those planets have a changeable atmosphere; which changeable atmosphere may, by a like argument, be inferred of the satellites of Jupiter, and therefore by similitude the same may be concluded of the other planets.

4. In like manner, from the mountains observed in Venus, the same may be supposed in the other planets.

5. Since then Saturn, Jupiter, both their satellites, Mars, Venus, and Mercury, are opaque bodies, shining with the sun's borrowed light, are furnished with mountains, and encompassed with a changeable atmosphere; they have, of consequence, waters, seas, &c. as well as dry land, and are bodies like the moon, and therefore like the earth, Q. E. D.

And hence nothing hinders but that the planets may also be concluded to be inhabited. Huygens, in his Cosmotheoros, argues very plausibly for the existence of planetary inhabitants, from the similitude of the planets with our earth: those, like this, being opaque, dense, uneven, round, heavy, illuminated and warmed by the sun; having night and day, summer and winter, &c.

Wolfius deduces something relating hereto from arguments of another kind. Thus, e. gr. it is scarce to be doubted, that the inhabitants of Jupiter are much larger than those of the earth; and, in effect, of the giant kind. For it is shewn in opticks, that the pupil of the eye contracts in a strong light, and dilates in a weak one; wherefore, since in Jupiter the sun's meridian light is much feebler than on the earth, by reason of Jupiter's greater distance from the sun; the pupil will need to be much more dilatable in the inhabitants of Jupiter, than in those of the earth. But the pupil is observed to have a constant proportion to the ball of the eye, and the eye to the rest of the body; so that, in animals, the larger the pupil, the larger the eye, and the larger the body.

To ascertain the size of these jovial inhabitants, it may be observed, that the distance of Jupiter from the sun is to the earth's distance from the same, as 26 to 5; the intensity of the sun's light in Jupiter is to its intensity on the earth, in a duplicate ratio of 5 to 26; but it is found by experience, that the pupil dilates in a ratio greater than that wherein the intensity of light decreases; otherwise, a body at a great distance might be seen as clearly as nearer: the diameter, therefore, of the pupil in

in its greateſt dilatation, in Jupiter, is to its diameter in the like ſtate in the earth, in a ratio greater than that of 5 to 26. If then we put it, as 10 to 26, or as 5 to 13: ſince the ordinary ſtature of the inhabitants of the earth is computed at 5 Engliſh feet, 4 inches and $\frac{1}{18}$ (which Wolfius tells us is his own height;) the ordinary ſtature of Jupiter's inhabitants will be found 14 feet $\frac{2}{3}$, which is very nearly the ſize of the giant Og, mentioned by Moſes, whoſe iron bed was 9 cubits long, and its breadth 4.

In the Copernican ſyſtem, the proportion between the ſemi-diameters of the planetary orbits, or between the diſtances of the ſeveral planets from the ſun, is found by trigonometry; ſo that if the diſtance of any one of them, as for inſtance, if the diſtance of the earth from the ſun be given, the diſtances of all the reſt of the planets from the ſun may be found: in any of the ſuperior planets, the ratio its diſtance from the ſun bears to the diſtance of the earth from the ſun is known, by meaſuring the angle of the planet's retrogradation.

The diſtances of the planets from the ſun are found to be in a certain ratio to the periodical times of their revolutions round the ſun; the ſquares of their periodical times are as the cubes of their diſtances: this analogy, diſcovered by Kepler, furniſhes us with a method of finding the ratio between the diſtances of the planets from the ſun, to greater exactneſs than can be done by any other method; becauſe the periodical times of the planets are known to great exactneſs.

We have hitherto conſidered the phænomena of the heavenly bodies without regard to the accurate form of their orbits, which is not circular, but elliptical; yet that it is very little ſo, even in the moſt excentrick orbit, as that of Mercury, will appear by comparing their excentricities with their mean diſtances from the ſun. Thus, ſuppoſe the mean diſtance of the earth from the ſun be divided into 1000 equal parts, then in thoſe parts we have,

In Mercury,	CS : DS	::	80	:	387	::	1	:	4,84
Venus,	CS : DS	::	5	:	723	::	1	:	144,6
Earth,	CS : DS	::	17	:	1000	::	1	:	19
Mars,	CS : DS	::	141	:	1524	::	1	:	10,8
Jupiter,	CS : DS	::	250	:	5201	::	1	:	20,8
Saturn,	CS : DS	::	547	:	9538	::	1	:	17,4

It is found by experience, that the orbits of the planets are quieſcent, or that the line of the apſides always keeps one and the ſame poſition with reſpect to the fixed ſtars: and the aphelium poſſeſſes different points in the ecliptick in the ſeveral orbits.

That the earth's orbit is elliptical, is well known from common experience; for were the orbit circular, the ſun's apparent diameter would always be the ſame; but we find it is not, for if it be meaſured with a micrometer in winter-time, it will be found conſiderably larger than in the ſummer, and it will be greateſt of all when the ſun is in the 8° of ♑ (which ſhews that is the place of the aphelium) it being then 32′ 47″; whereas, when the ſun is in the 8° of ♋, his diameter is but 31′ 40″.

Hence it is evident that the ſun is really nearer to us in the midſt of winter than in the midſt of ſummer; but this ſeems a paradox to many, who think the ſun muſt needs be hotteſt when it is neareſt to us, and that the ſun is apparently more diſtant from us in December than in June. As to the ſun's being hotter, it is true, it is ſo to all thoſe places which receive his rays directly or perpendicularly, but we find his heat abated on account of the obliquity of the rays, and his ſhort continuance above the horizon at that time. And, as to his diſtance, it is only with reſpect to the zenith of the place, not the centre of the earth; ſince it is plain, the ſun may approach the centre of the earth, at the ſame time that it recedes from the zenith of any place.

Agreeable to the ſun's nearer diſtance in the winter, we obſerve his apparent motion is then quicker than in ſummer; for in the 8° of ♑ it is about 61′ per day, but in the 8° of ♋ his motion is but 57′ per day. Accordingly, we find the ſummer half-year 8 days longer than the winter half-year, as appears by the following computation, according to the new ſtyle.

Summer half-year includes		Winter half-year includes	
In March	10½ days	In September	07 days.
April	30	October	31
May	31	November	30
June	30	December	31
July	31	January	31
Auguſt	31	February	28
September	23	March	20½
Summer-half	186½		178½
Winter-half	178½		
The difference	8 days.		

For the ſun's attracting force being one part of the cauſe of the planet's motion, and this force always increaſing and decreaſing in the inverſe ratio of the ſquares of the diſtances, it is evident the velocity of the planet will always be greater the nearer it is to the ſun, and vice verſa. Hence the motion of a planet is every where unequable, being conſtantly accelerated, as it paſſes from A by D to P, and in the other half from P to A it is retarded.

Yet is this unequal motion of a planet regulated by a certain immutable law, from which it never varies, which is, that a line, drawn from the centre of the ſun to the centre of the planet, does ſo move with the planet about the ſun, that it deſcribes elliptick areas always proportional to the times. That is, if when the planet moves ſloweſt, it deſcribes the arch A *d* in a given time, and when it moves quickeſt, it deſcribes the arch *b* P in the ſame time, then will the trilineal area A S *d* be equal to the other trilineal area *b* S P.

To demonſtrate this, let the time in which the planet moves through the periphery of its orbit be divided into equal parts, and ſuppoſe that in the firſt part it deſcribed any right line AB (*plate* LXVI. *fig.* 1.) by the projectile force in any direction, and the centripetal force conjointly; then in the ſecond part of time it would proceed in the ſame right line to *c*, if nothing prevented; ſo that B *c* = A B, as is manifeſt from the firſt law of motion.

Draw the right lines S B, S *c*, and the triangles A B S and B *c* S will be equal, as having equal baſes A B, B *c*, and the ſame altitude of the vertex S. But when the body comes to B, let the centripetal force act with a new impulſe either equal to the former or unequal, and let it cauſe the body to decline from the right line B *c*, and deſcribe the right line BC; draw C *c* parallel to B S, meeting BC in C; and at the end of the ſecond part of time the body will be at C, and in the ſame plane with the triangle A S B. Join S C, and becauſe of the parallels S B, C *c*, the triangle S B C will be equal to the triangle S B *c*, and therefore equal to the triangle S A B. By the ſame way of reaſoning, if the centripetal force act ſucceſſively in the points C, D, E, cauſing the body in each equal part of time to deſcribe the right lines C D, D E, E F, &c. the triangles S C D, S D E, S E F, &c. will be equal, and all in the ſame plane.

In equal times, therefore, equal areas are deſcribed; and, by compoſition of ratios, any ſums of areas S A D S, S A F S, are to each other as the times in which they are deſcribed. Let now the number of triangles be increaſed, and their breadth be diminiſhed in infinitum; then will their perimeter A D F be ultimately a curve; and, therefore, the centripetal force, by which the body is drawn perpetually from the tangent to this curve, acts inceſſantly; and the areas deſcribed are alſo in this caſe proportional to the times of their deſcription. Hence the velocity of the revolving body or planet is every where inverſely, as the perpendicular let fall from the centre S to the tangent of the orbit in the place of the planet. For the velocities in the points A, B, C, &c. are as the baſes of the triangles A B, B C, C D, &c. as being the ſpaces deſcribed in the ſame time; and the baſes of equal triangles are reciprocally as their perpendicular altitudes; and, therefore, ſince in the evaneſcent triangles A S B, A S C, &c. the right lines A *c*, B *d*, C *e*, &c. become tangents to the curve in the points A, B, C, &c. it is manifeſt, the velocity in thoſe points will be inverſely, as a perpendicular from S let fall upon thoſe tangent lines produced.

Hence alſo it follows, that the times in which equal arches are deſcribed in any planetary orbit are directly as thoſe perpendiculars, becauſe they are inverſely as the velocities.

PLANETARY, ſomething relating to the planets.

PLANETARY *Syſtem*, the ſyſtem or aſſemblage of the planets, both primary and ſecondary, moving in their reſpective orbits round the ſun, their common centre.

PLANETARY *Days*, among the ancients, the week was ſhared among the ſeven planets, each planet having its day: and hence, in moſt European languages, the days of the week are ſtill denominated from the planets, as Sunday, Monday, &c.

PLANETARY *Years*, the reſpective periods of time in which the planets make their revolutions round the ſun or earth.

PLANETARY *Dials*, thoſe whereon the planetary hours are inſcribed.

PLANETARY *Squares*, the ſquares of the ſeven numbers, from three to nine, diſpoſed magically.

PLANIMETRY, *Planimetria*, that part of geometry which conſiders lines and plain figures, without any conſideration of heights or depths, in oppoſition to ſtereometry, or the menſuration of ſolids.

It is performed with ſquare feet, ſquare inches, ſquare yards, ſquare perches, &c.

PLANISPHERE, a projection of the ſphere, and its circles, on paper or the like. In this ſenſe, maps of the heavens and earth are called planiſpheres.

It alſo denotes an aſtronomical inſtrument, uſed in obſerving the motions of the heavenly bodies; conſiſting of a projection of the celeſtial ſphere upon a plane repreſenting the ſtars, conſtellations, &c. in their proper ſituations, &c. Such is the aſtrolabe, which is a common name for all ſuch projections, which ſee.

PLANO-CONCAVE GLASS, or lens, ſuch a glaſs, one of whoſe ſurfaces is concave, and the other plain. Its concavity is ſpherical, unleſs the contrary be expreſſed.

PLANO-CONVEX *Glaſs*, or lens, ſuch a glaſs, one of whoſe ſurfaces is convex, and the other plain. Its convexity is ſuppoſed to be ſpherical, unleſs the contrary be expreſſed.

PLANT, *planta*, is defined to be an organical body, deſtitute of ſenſe and ſpontaneous motion, adhering to another body in ſuch a manner as to draw from it its nouriſhment, and having power of propagating itſelf by ſeeds

As to the parts of which a plant conſiſts, they are the root, ſtalk, leaf, flower and fruit.

Plant and vegetable are pretty near terms ſynonimous, every plant being a vegetable. Dr. Boerhaave defines a vegetable to be a body generated of the earth, or ſomething ariſing of the earth, to which it adheres or is connected by parts called roots, through which it receives the matter of its nouriſhment and increaſe; and conſiſts of juices and veſſels ſenſibly diſtinct from each other: or, a vegetable is an organical body, compoſed of veſſels and juices every where diſtinguiſhable from each other; to which body grow roots or parts, whereto it adheres, and from which it derives the matter of its life and growth.

This definition furniſhes a juſt and adequate idea of a vegetable; for by its conſiſting of diſtinct veſſels and juices, it is diſtinguiſhed from a foſſil; and by its adhering to another body, from which it derives its nouriſhment, and being deſtitute of ſenſation, it is ſufficiently diſtinguiſhed from an animal.

The veſſels, or containing parts of plants, conſiſt chiefly of earth, bound or connected together by oil, as a glutton: which being exhauſted by fire, air, age, or the like, the plant moulders, or returns again into its earth or duſt: but it muſt be owned, that water, air, ſalt, and ſulphur or oil, are likewiſe conſtituent parts of plants, ſince they can be all obtained by a well managed analyſis.

The root, or part whereby plants are connected to their matrix, and by which they receive their nutritious juice, conſiſts of an infinite number of abſorbent veſſels, which being diſperſed through the interſtices of the earth, attract or imbibe the juices of the ſame; conſequently, every thing in the earth that is diſſoluble in water, is liable to be imbibed, as air, ſalt, oil, and fumes of minerals, metals, &c. and of theſe plants do really conſiſt. See ROOT.

The motion of theſe nutritious juices is not unlike that of the blood in animals, being effected by the action of the air. The diſcovery of this we owe to the admirable Malpighi, who firſt obſerved, that plants conſiſt of two ſeries or orders of veſſels: 1. Such as receive and diſtribute the alimentary juices, anſwering to the arteries, lacteals, veins, &c. of animals. 2. The tracheæ, or air-veſſels, which are long hollow pipes, wherein air is commonly received and expelled; that is, inſpired and expired. Hence it follows, that the heat of the ſun muſt have a ſtrong effect on the air included in theſe tracheæ; whence ariſes a perpetual ſpring of action, to promote the circulation of the juices in plants

For the botanical diſtribution of plants into claſſes, genera, &c. ſee BOTANY, &c.

Foſſile PLANTS, thoſe found buried in the earth, and lodged in almoſt all the kinds of ſtrata, or ſubſtances, to be met with there.

PLANTA, in anatomy, the ſole of the foot. See the article FOOT.

PLANTAIN, *Plantago*, in botany, a plant the flower whereof conſiſts of one petal, uſually wide expanded at the mouth, and with the limb divided into four oval ſegments: the fruit is a bilocular capſule, of an ovated figure, containing a great many oblong ſeeds.

The root, leaves, and ſeeds of plantain are uſed in medicine, and reckoned cooling and aſtringent; being much recommended in fluxes of all kinds, particularly hæmorrhages, whether from the noſe, mouth, or uterus. It is likewiſe accounted a great healer of freſh wounds.

Ribwort, and bucks-horn plantain, are two ſpecies of, and agree with, plantain in virtues.

PLANTARIS MUSCULUS, or *Tibialis Gracilis*, in anatomy, a ſmall pyriform muſcle, ſituated obliquely in the ham, below the external condyle of the os femoris, between the poplitæus and gaſtrocnemius externus; and its tendon which is long, flat, and very ſmall, runs down on the ſide of the gaſtrocnemius internus all the way to the heel.

PLANTATION, in the W. Indies, a ſpot of ground which ſome perſon pitches on to cultivate for his own uſe.

PLANTING, in agriculture and gardening, the ſetting of a tree or plant, taken up from its former place, in a new hole proportional to its bulk, throwing freſh earth over its root, and filling up the hole to the level of the ground.

PLANTING *of Wall-fruit trees*. After two years growth in the nurſery, ſtone-fruit, being firſt inoculated or grafted, are ready for removal, which is beſt done in October or November.

A hole is dug two feet deep; or, if the ſoil be not very good, the pit is made ſhallower and earth raiſed above it. With the ſoil dug up, they frequently mix either a rich ſoil or manure, ſo as the mixture be at leaſt as rich as the ſoil out of which the plant came. The hole being half filled up, it is trodden down; all the extremities of the root are cut off, and the tree fitted to the wall by cutting off ſuch branches as grow directly either towards or fromwards the wall, and leaving only the ſide branches, which are to be nailed to it. This done, the tree is ſet in the hole, as far from the wall as is conſiſtent with the head's ſpreading thereon, that the root may have the more room backwards, and the hole then filled up with the compoſt.

Reverſe PLANTING, is a method of planting, wherein the ordinary poſition of the plant or ſhoot is inverted; the branches being ſet in the earth, and the roots reated into the air. Mr. Fairchild gives the following directions for the performance thereof: Chuſe a young alder, elm, willow, or any other tree of one ſhoot that readily takes root by laying: bend the ſhoot gently down till the extreme part be in the ground, and ſo let it remain till it has taken good root. This done, dig about the firſt root, and gently take it up out of the ground till the ſtem be nearly upright; in which ſtate take it up. Then prune the roots, now erected in the air, from the wounds thereby received in being dug; and anoint the pruned part with a compoſition of four parts of bees-wax, two of reſin, and two of turpentine, melted together and applied pretty warm. Then prune off all the ſhoots or buds upon the ſtem, and dreſs the wounds with the ſame compoſition, to prevent any collateral ſhootings; and leave the reſt to nature.

PLANTING, in architecture, denotes the laying the firſt courſes of ſtone on the foundation, according to the meaſures, with all poſſible exactneſs.

PLASHING *of Quickſet Hedges*, an operation very neceſſary

neceſſary to promote the growth and continuance of old hedges.

It is performed in this manner: the old ſtubs muſt be cut off, &c. within two or three inches of the ground, and the beſt and longeſt of the middle ſized ſhoots muſt be left to lay down. Some of the ſtrongeſt of theſe muſt alſo be left to anſwer the purpoſe of ſtakes. Theſe are to be cut off to the height at which the hedge is intended to be left; and they are to ſtand at ten feet diſtance one from another: when there are not proper ſhoots for theſe at the due diſtances, their places muſt be ſupplied with common ſtakes of dead wood. The hedge is to be firſt thinned, by cutting away all but thoſe ſhoots which are intended to be uſed either as ſtakes, or the other work of the plaſhing: the ditch is to be cleaned out with the ſpade: and it muſt be now dug as at firſt, with ſloping ſides each way; and when there is any cavity on the bank on which the hedge grows, or the earth has been waſhed away from the roots of the ſhrubs, it is to be made good by facing it, as they expreſs it, with the mould dug from the upper part of the ditch; all the reſt of the earth dug out of the ditch is to be laid upon the top of the bank, and the owner ſhould look carefully into it that this be done; for the workmen, to ſpare themſelves trouble, are apt to throw as much as they can upon the face of the bank; which being by this means overloaded, is ſoon waſhed off into the ditch again, and a very great part of the work undone; whereas what is laid on the top of the bank always remains there, and makes a good fence of an indifferent hedge.

In the plaſhing the quick, two extremes are to be avoided; theſe are, the laying it too low, and the laying it too thick: this makes the ſap run all into the ſhoots, and leaves the plaſhes without ſufficient nouriſhment; which, with the thickneſs of the hedge, finally kills them. The other extreme of laying them too high is equally to be avoided; for this carries up all the nouriſhment into the plaſhes, and ſo makes the ſhoots ſmall and weak at the bottom, and, conſequently, the hedge thin. This is a common error in the north of England. The beſt hedges made any where in England, are thoſe in Hertfordſhire; for they are plaſhed in a middle way between the two extremes, and the cattle are by that prevented both from cropping the young ſhoots, and from going through; and a new and vigorous hedge ſoon forms itſelf. When the ſhoot is bent down that is intended to be plaſhed, it muſt be cut half way through with the bill: the cut muſt be given ſloping, ſomewhat downwards, and then it is to be wound about the ſtakes, and after this its ſuperfluous branches are to be cut off, as they ſtand out at the ſides of the hedge. If for the firſt year or two the field where a new hedge is made can be ploughed, it will thrive the better for it; but if the ſtubs are very old, it is beſt to cut them quite down, and to ſecure them with good dead hedges on both ſides, till the ſhoots are grown up from them ſtrong enough to plaſh; and wherever void ſpaces are ſeen, new ſets are to be planted to fill them up. A new hedge raiſed from ſets in the common way, generally requires plaſhing about eight or nine years after.

PLASTER, *Emplaſtrum*, in pharmacy, is defined to be an external application, of a harder conſiſtence than our ointments: theſe are to be ſpread according to the different circumſtances of the wound, place, or patient, either upon linen or leather,

Plaster, among builders, &c. The plaſter of Paris is a preparation of ſeveral ſpecies of gypſums, dug near Mont Martre, a village in the neighbourhood of Paris; whence the name.

PLASTICK, a thing endued with a formative power, or a faculty of forming or faſhioning a maſs of matter, after the likeneſs of a living being; ſuch a virtue as ſome of the ancient Epicureans, and perhaps the Peripateticks too, imagined to reſide in the earth, or, at leaſt, to have anciently reſided therein; by means whereof, and without any extraordinary intervention of a creator, it put forth plants, &c. Some of them ſeem to be of opinion, that animals, and even man himſelf, was the effect of this plaſtick power.

PLASTICE, the plaſtick art, a branch of ſculpture, being the art of forming figures of men, birds, beaſts, fiſhes, &c. in plaſter, clay, ſtucco, or the like.

PLAT-Veins, in the manage, the veins wherein we bleed horſes, one in the lower part of each ſhoulder, and the other in the flat part of the thighs.

Plats *of a Ship*, flat ropes made of rope-yarn, and weaved one over the other; they ſerve to ſave the cable from galling in the hauſe, or to wind about the flukes of the anchors, to ſave the pennant of the fore-ſheet from galling againſt them.

PLATBAND *of a Door or Window*, is uſed for the lintel, where that is made ſquare, or not much arched; theſe platbands are uſually croſſed with bars of iron when they have a great bearing, but it is much better to eaſe them by arches of diſcharge built over them.

Platbands *of Flutings*, are the liſts or fillets between the flutings of columns.

PLATE, in commerce, ſignifies gold or ſilver wrought into veſſels, for domeſtick uſes.

Plate, in heraldry, is a round flat piece of ſilver, without any impreſſion; but, as it were, formed ready to receive it.

Plate, is alſo a term uſed by our ſportſmen, to expreſs the reward given to the beſt horſes at our races.

Plates, in gunnery. The priſe-plates are two plates of iron on the cheeks of a gun-carriage, from the capeſquare to the centre, through which the priſe bolts go, and on which the handſpike reſts when it poiſes up the breech of the piece.

Breaſt-plates are the two plates on the face of the carriage, one on each cheek. Train-plates are the two plates on the cheeks, at the train of the carriage. Dulidge-plates are the ſix plates on the wheel of a guncarriage, where the fellows are joined together, and ſerve to ſtrengthen the dulidges.

PLATFORM, in the military art, an elevation of earth, on which cannon is placed, to fire on the enemy; ſuch are the mounts in the middle of curtins: on the rampart there is always a platform, where the cannon are mounted. It is made by the heaping up of earth on the rampart, or by an arrangement of madriers, riſing inſenſibly, for the cannon to roll on, either in a caſemate, or on attack in the outworks.

Platform, in architecture, is a row of beams, which ſupport the timber-work of a roof, and lie on the top of the wall, where the entablature ought to be raiſed.

This term is likewiſe uſed for a kind of terrace, or broad, ſmooth, open walk, at the top of a building, from whence a fair proſpect may be taken of the adjacent country. Hence an edifice is ſaid to be covered with a platform, when it is flat at top, and has no ridge. Moſt of the oriental buildings are thus covered, as were all thoſe of the ancients.

Platform, or *Orlap*, in a man of war, a place on the lower deck, abaft the main-maſt, between it and the cockpit, and round about the main capſtan, where proviſion is made for the wounded men in time of action.

PLATONICK, ſomething relating to Plato.

Platonick *Bodies*, the ſame with Regular *Bodies*, which ſee.

Platonick *Love*, denotes a pure affection ſubſiſting between the different ſexes, abſtracted from all carnal appetite, and regarding only the mind and its beauties; or even a ſincere diſintereſted friendſhip between perſons of the ſame ſex, abſtracted from all ſelfiſh views, and terminating only in the perſon. Plato's notions of love and friendſhip appear to be arrant chimeras, contrary to the intentions of nature, and inconſiſtent with the great law of ſelf-preſervation, into which love and friendſhip are both ultimately reſolvible.

Platonick *Year*, or great year, is a period of time determined by the revolution of the equinoxes; or the ſpace wherein the ſtars and conſtellations return to their former places, in reſpect of the equinoxes. This year, according to Tycho Brahe, is 25816; according to Ricciolus, 25920; according to Caſſini, 24800 years. This period once accompliſhed, the ancients thought the world was to begin anew, and the ſame ſeries of things to turn over again.

PLATONISM, the doctrine and ſentiments of Plato and his followers with regard to philoſophy, &c.

Plato was an Athenian, born about the year of the world 3625, who, after ſpending his youth in the exerciſes of the body, in painting and poetry, became a diſciple of Socrates. After his maſter's death he applied himſelf to Cratylus and Hermogenes, till, being maſter

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of the Greek philofophy, he travelled into Italy, where he learnt that of the Pythagoreans. Thence he proceeded into Egypt, where he became fully acquainted with the mysteries of the Egyptian priefts.

At his return to Athens, he began to philofophize in the academy, a delicious villa in the neighbourhood of that city: and hence his difciples were called academicks.

After his death, two of the principal of his fcholars, Ariftotle and Zenocrates, taught, the one in the academy, and the other in the lyceum, forming two fects under different names, though in other refpects the fame, viz. Academicks and Peripateticks.

PLATOON, in war, a fmall body of men, in a battalion of foot, &c. that fire alternately, the whole lines being divided into a certain number for the moft part advancing fomewhat beyond the main body, in order either to fupport the fquadrons of horfe, or in ambufcades and defiles. Platoons are alfo ufed in the hollow fquare.

PLATYSMA Myoides, in anatomy, a name given by Fallopius to one of the mufcles, called latiffima colli, by fome quadratus genæ, and fubcutaneus by others.

PLEADING, *Placitatio*, fomething fpoken at the bar in defence of a client's caufe.

Since the conqueft down to Edward III. all pleading was performed in French, when it was appointed that the pleas fhould be pleaded in Englifh, but entered and recorded in Latin. It is but of late years that eloquence has been admitted to the bar among us.

Pleadings, in a more ftrict fenfe, denote all the allegations of the parties to a fuit, made after the count or declaration, till the iffue be joined.

PLEASURE and pain, fays Mr. Locke, are fimple ideas, which we receive both from fenfation and reflection; there being thoughts of the mind, as well as fenfations, accompanied with pleafure or pain.

PLEBEIAN, *Plebeius*, any perfon of the rank of the common people. It is chiefly ufed in fpeaking of the ancient Romans, who were divided into fenators, knights, and plebeians, or commoners.

PLEBISCITUM, among the Romans, a law enacted by the common people at the requeft of the tribune or other plebeian magiftrate, without the intervention of the fenate, but more particularly denotes the law which the people made, when they retired to the Aventine mount.

PLEDGE, *Plegius*, in common law, a furety, either real or perfonal, which the plaintiff is to find for his profecuting the fuit.

PLEDGERY, Pleggery, furetifhip, or an anfwering for another perfon.

PLEDGET, *Bolfter*, *Comprefs*, *Plumaceolus*, in chirurgery, a kind of flat tent laid over a wound, to imbibe the fuperfluous humours, and keep it clean.

PLEGIIS Acquietandis, in law, a writ that lies for a furety againft him, for whom he is furety, in cafe he pay not the money at the day.

PLEIADES, *Virgiliæ*, in aftronomy, an affemblage of feven ftars in the neck of the conftellation Taurus. See Constellation and Taurus.

PLENARTY, in law, is when a church benefice is full of an incumbent.

PLENARY, fomething complete or full.

PLENILUNIUM, in aftronomy, that phafis of the moon commonly called the full moon. See Moon.

PLENIPOTENTIARY, a perfon vefted with full power to do any thing. See Ambassador.

PLENITUDE, *Plenitudo*, the quality of a thing that is full, or fills another. In medicine it chiefly denotes a redundancy of blood and humours. See the article Plethora.

PLENUM, in phyficks, denotes, according to the Cartefians, that ftate of things, wherein every part of fpace is fuppofed to be full of matter; in oppofition to a vacuum. See Vacuum.

PLEONASM, *Pleonafmus*, *Redundantia*, a figure in rhetorick, whereby we ufe words feemingly fuperfluous, in order to exprefs a thought with the greater energy; fuch as, "I faw it with my own eyes, &c."

PLEROTICKS, *Plerotica*, in medicine, a kind of remedies that are healing, or that fill up the flefh: otherwife called incarnatives and farcoticks. See the article Sarcoticks.

PLETHORA, in medicine, a greater redundance of laudable blood and humours than is capable of undergoing thofe changes which muft neceffarily happen for the purpofes of life, without inducing difeafes.

A plethora is cured by venefection, exercife, watchings, a fharp and acrid diet, after due evacuations, and by a gradual omiffion of thefe evacuations.

PLETHORICK, *Plethoricus*, a perfon abounding with blood, or labouring under a plethora.

PLEURA, in anatomy, a fmooth, robuft, and tenfe membrane, adhering to the ribs and to the intercoftal mufcles, and furrounding the whole cavity of the thorax. Its ftructure refembles two facks, one of which furrounds one fide of the thorax, and the other the other fide; and each of them contains one of the two lobes of the lungs: from the conjunction of thefe two facculi of the pleura, in the middle of the thorax, is formed the mediaftinum. The ufe of the pleura is to lubricate and ftrengthen the whole cavity of the thorax.

PLEURISY, in medicine, a violent pain in the fide, attended with an acute fever, a cough, and a difficulty of breathing.

Dr. Mead obferves, on the treatment of this diforder, that after drawing as much blood as is neceffary, draughts with frefh-drawn linfeed oil, are of great fervice for eafing the cough; nitre, for allaying the heat; and for diffolving the fizy blood that obftructs the fmall canals, wild goat's blood and volatile falts; and, laftly, a blifter laid on the part affected, in order to draw forth the peccant humour.

As to the baftard pleurify, Hoffman fays, that it is properly a kind of rheumatifm, and does not require bleeding unlefs the patient is plethorick, but a diaphorefis and a more free perfpiration. Lancifi, however, advifes plentiful bleeding in the arm, fcarifying the part affected, and cupping: and during the cure, it is neceffary to keep the body open, and the bowels free from fpafms; for which purpofe emollient clyfters are proper, with oil of fweet almonds.

PLEUROPNEUMONY, in medicine, a difeafe partaking of the nature both of a pleurify and peripneumony.

PLEXUS, among anatomifts, a bundle of fmall veffels interwoven in the form of net-work; thus a congeries of veffels within the brain is called plexus choroides, reticularis, or retiformis. See Choroides.

A plexus of nerves is an union of two or more nerves, forming a fort of ganglion or knot.

PLICA Polonica, in medicine, a difeafe of the hair, almoft peculiar to Poland and Lithuania, and hence denominated Polonica. It confifts of a preternatural bulk of hair, which being firmly conglutinated and wrapped up in inextricable knots, and extended to a monftrous length, affords a very unfeemly fpectacle. When thefe are cut off, the blood is difcharged from them, the head racked with pain, the fight impaired, and the patient's life frequently endangered.

PLICATED, fomething folded together, one part over another; as the leaves of certain plants, &c.

PLINTH, Orle, or Orlo, in architecture, a flat fquare member, in the form of a brick. It is ufed as the foundation of columns, being that flat fquare table, under the moulding of the bafe and pedeftal, at the bottom of the whole order. It feems to have been originally intended to keep the bottom of the original wooden pillars from rotting. Vitruvius alfo calls the Tufcan abacus, plinth.

Plinth *of a Statue*, &c. is a bafe, either flat, round, or fquare, that ferves to fupport it.

Plinth *of a Wall*, denotes two or three rows of bricks advancing out from a wall; or, in general, any flat high moulding, that ferves in a front wall to mark the floors, to fuftain the caves of a wall, or the larmier of a chimney.

PLOT, in dramatick poetry, is fometimes ufed for the fable of a tragedy or comedy, but more particularly the knot or intrigue, which makes the embarras of any piece. The unravelling puts an end to the plot.

Plot, in furveying, the plan or draught of any field, farm, or manor, furveyed with an inftrument, and laid down in the proper figures and dimenfions.

Plotting, among furveyors, is the art of laying down on paper, &c. the feveral angles and lines of a tract of ground furveyed by a theodolite, &c. and a chain.

In surveying with the plain-table, the plotting is saved; the several angles and distances being laid down on the spot, as fast as they are taken. But, in working with the theodolite, semi-circle, or circumferentor, the angles are taken in degrees; and the distances in chains and links; so there remains an after operation to reduce these members into lines, and so to form a draught, plan, or map; this operation is called plotting. Plotting then is performed by means of two instruments, the protractor and plotting scale. By the first, the several angles observed in the field with a theodolite, or the like, and entered down in degrees in the field-book, are protracted on paper in their just quantity. By the latter, the several distances measured with the chain, and entered down in like manner in the field-book, are laid down in their just proportion.

Method of plotting from the circumferentor. Suppose an inclosure, e. gr. A, B, C, D, E, F, G, H, K, (*plate* LXIV. *fig.* 3.) to have been surveyed; and the several angles, as taken by a circumferentor, in going round the field, and the distances as measured by a chain, to be found entered in the field-book, as in the following table:

	Deg.	Min.	Cha.	Link.		Deg.	Min.	Cha.	Link.
A	191	00	10	75	F	324	30	7	54
B	297	00	6	83	G	98	30	7	54
C	216	30	7	82	H	71	00	7	78
D	325	00	6	96	K	161	30	8	22
E	12	24	9	71					

On a paper of the proper dimensions, as LMNO, draw a number of parallel and equidistant lines. Their use is to direct the position of the protractor; the diameter whereof must always be laid either upon one of them or parallel thereto; the semi-circular limb downwards for angles greater than 180°, and upwards, for those less than 180°.

The paper being thus prepared, assume a point on some meridian as A, whereon lay the centre of the protractor, and the diameter along the line. Consult the field-book for the first angle, i. e. for the degrees cut by the needle at A, which the table gives you 191°.

Now since 191 is more than a semi-circle, or 180, the semi-circle of the protractor is to be laid downwards; when keeping it to the point with the protracting pin, make a mark against 191; through which mark from A draw an indefinite line A *b*. The first angle thus protracted, again consult the book, for the length of the first line A B; thus you find 10 chains 75 links. From a convenient scale, therefore, on the plotting scale take the extent of 10 chains 75 links between the compasses; and, setting one point in A, mark where the other falls in the line A *b*, which suppose in B: draw therefore the full line A B, for the first side of the inclosure.

Proceed then to the second angle, and laying the centre to the protractor on the point B, with the diameter as before directed, make a mark as *c*, against 297°, the degrees cut at B; and draw the indefinite line B *c*. On this line, from the plotting-scale, as before, set off the length of your second line, viz. 6 chains 83 links; which extending from B to the point C, draw the line B C for the second side. Proceed now to the third angle or station, lay then the centre of the protractor, as before, on the point C; make a mark as *d* against the number of degrees cut at C, viz. 216; draw the indefinite line C *d*, and thereon set off the third distance, viz. 7 chains 82 links; which terminating, e. gr. at D, draw the full line C D for the third side.

Proceed now to the fourth angle D; and, laying the centre of the protractor over the point D, against 325°, the degree cut by the needle, make a mark *e*; draw the dry line D *e*, and thereon set off the distance 6 chains 96 links, which terminating in E, draw D E for the fourth line, and proceed to the fifth angle, viz. E.

Here the degrees cut by the needle being 12° 24′ (which is less than a semi-circle) the centre of the protractor must be laid on the point E, and the diameter on the meridian, with the semi-diameter limb turned upwards. In this situation, make a mark, as before, against the number of degrees, viz. 12° 24′ cut by the needle at E; draw the dry line E *f*, on which set off the fifth distance, viz. 9 chains 71 links; which extending from E to F, draw the full line E F, for the fifth side of the inclosure.

After the same manner proceed orderly to the angles F, G, H, and K; then placing the protractor, making marks against the respective degrees, drawing indefinite day lines, and, setting off the respective distances as above, you will have the plot of the whole inclosure A B C, &c.

Such is the general method of plotting from this instrument; but it must be observed, that in this process the stationary lines, i. e. the lines wherein the circumferentor is placed to take the angles, and wherein the chain is run to measure the distances are properly the lines here plotted. When, therefore, in surveying, the stationary lines are at any distance from the fence or boundaries of the field, &c. off-sets are taken, i. e. the distance of the fence from the stationary line is measured at each station; and even at intermediate places, if there prove any considerable bends in the fence.

In plotting therefore the stationary lines being laid down as above, the off-sets must be laid down from them, i. e. perpendiculars of the proper length must be let fall at the proper places from the stationary lines. The extremes of which perpendiculars, being connected by lines, give the plot desired. If instead of going round the field, the angle and distances have been all taken from one station, the process of plotting is obvious, from the example above: all here required being to protract, after the manner already described, the several angles and distances taken from the same stationary point in the field, from the same point, or centre of the paper. The extremities of the lines thus determined, being then connected by lines, will give the plot required.

The following is a new plotting instrument invented by Mr. Henry Beighton. It is a plain smooth board about 18 inches square and three fourths of an inch thick, as A B C D (*fig.* 2.) made of mahogany, walnut, pear-tree, or Norway oak, well clamped at the ends, or a brass frame round it to prevent its warping, and, as much as possible, shrinking and swelling.

Within six tenths of an inch of its opposite sides (and parallel to them and one another) are two grooves E F, G H, cut on the face half an inch deep, to let in two brass holders in the shape of N O (*fig.* 5.) which are each of one piece of cast brass, like two brass rulers joined together at right angles. The perpendicular part is one tenth and 300 parts of an inch thick, as at *d*, half an inch deep, and a little shorter at each end than the upper part which is 17 inches long, three tenths broad, and about eight parts of a hundredth of an inch thick; about two inches and a half from each end of the holder, are thick parts or bosses in the upright piece, as at P and Q, through which are holes drilled to receive the screws P S, Q R, which screws go each through a brass plate at T and V, fixed by rivets on the under side of the table, and little round nuts, (as at *a* and *b*) put on them, to confine them in their shoulders in turning in the plates, that they never rise nor fall; these holes must go easy in the groves, to sink even with the upper surface of the table. Then when the screws enter the holes of the holders by turning R and S at the same time forward, the holders will fall and pinch down any papers, &c. that are under them; and turning backward, will rise and release them. In the middle of one end of the table is a groove to receive the brass W, which has the same sort of screw and fixing as the other to rise or fall it. But the groove is quadrantal, that the holder W may on occasion be turned so as to lie all on the outside the line E K, and to cross it in case of high winds, for securing the paper down, on three sides; and a fourth might be added, but there is seldom any occasion for it.

To the centre of the table underneath is fixed a brass socket, so truly made that the table may, when set, turn round truly horizontally: and a machine cased with glass, in which a plummet hangs to set the table level; or the parallel plates, or glass tubes of spirit of wine, may be used to make it horizontal, as any one sees occasion to fancy them. To any one of the fourth edges underneath is screwed a box and needle, set to the variation. There belongs to this instrument a strong three-legged staff, and an index with plain or telescopical sights, near two feet long. The papers or charts for this table are to be either a thin fine pasteboard, fine paper pasted on cartridge paper, or two papers pasted together, cut as exactly square as possible, each side being nearly sixteen inches and a half long,

long, juſt as they may ſlide in eaſy between the upright part, and between the flat part of the holders.

Any of theſe charts may be put in the table four different ways, be fixed, taken out, or changed at pleaſure; any two of them may be joined together truly on the table, if you make each of them meet exact at the line LM, whilſt near one half of each will hang over the ſides of the table; or, by creſting or doubling each, the whole of them will be within the table. And if occaſion ſhould happen, as ſeldom it does, by creſting each paper both ways through the middle, four of them may be put on at one time, meeting in the centre of the table.

Each chart is always croſſed by right angles through the middle, for the purpoſe above, and to make any of them anſwer to the guide-lines on the table IK, LM, drawn quite through the centre, and the whole table. So the grand objection of ſhifting papers is obviated.

PLOTTING *Scale*, a mathematical inſtrument, uſually of wood, ſometimes of braſs, or other matter; and either a foot, or half a foot long. On one ſide of the inſtrument are ſeven ſeveral ſcales, or lines, divided into equal parts. The firſt diviſion of the firſt ſcale is ſubdivided into 10 equal parts, to which is prefixed the number 10, ſignifying that 10 of thoſe ſubdiviſions make an inch; or that the diviſions of that ſcale are decimals of inches.

The firſt diviſion of the ſecond ſcale is likewiſe ſubdivided into 10, to which is prefixed the number 16, denoting that 16 of thoſe ſubdiviſions make an inch. The firſt diviſion of the third ſcale is ſubdivided in like manner into 10, to which is prefixed the number 20. To that of the fourth ſcale is prefixed the number 24; to that of the fifth 32; that of the ſixth 40; that of the ſeventh 48; denoting the number of ſubdiviſions equal to an inch, in each, reſpectively. The two laſt ſcales are broken off before the end, to give room for two lines of chords.

On the back-ſide of the inſtrument is a diagonal ſcale, the firſt of whoſe diviſions, which is an inch long, if the ſcale be a foot, and half an inch, if half a foot, is ſubdivided, diagonally, into 100 equal parts. At the other end of the ſcale is another diagonal ſubdiviſion, of half the length of the former, into the ſame number of parts, viz. 100. Next the ſcales, is a line divided into hundredth parts of a foot, numbered 10, 20, 30, &c. and a line of inches ſubdivided into tenth parts, marked 1, 2, 3, &c.

Uſe of the PLOTTING *Scale*. 1. Any diſtance being meaſured with the chain, to lay it down on paper. Suppoſe the diſtance to be 6 chains 50 links. Draw an indefinite line: ſet one foot of the compaſſes at figure 6 on the ſcale, e. gr. the ſcale of 20 in an inch, and extend the other to 5 of the ſubdiviſions, for the 50 links: this diſtance, being transferred to the line, will exhibit the 6 chains 50 links required.

If it be deſired to have 6 chains 50 links, take up more or leſs ſpace, take them off from a greater or leſs ſcale, i. e. from a ſcale that has more or fewer diviſions in an inch. To find the chains and links contained in a right line, e. gr. that is juſt drawn, according to any ſcale, e. gr. that of 20 in an inch. Take the length of the line in the compaſſes, and applying it to the given ſcale, you will find it extend from the number 6 of the great diviſions, to 5 of the ſmall ones: hence the given line contains 6 chains 50 links.

PLOUGH, in agriculture, a well known machine for the breaking up of ground, that conſiſts of a train, and two large irons, namely, the coulter and ſhare; the one pointed, the other edged. The ſtructure and contrivance of the plough is various in various kinds of ground; the chief of which are as follows:

Double-wheeled PLOUGH, uſed throughout Hertfordſhire, &c. It is one of the beſt, ſtrongeſt, and eaſieſt draughts of any, and ſuits all kinds of land, except miry clays in winter.

Lincolnſhire PLOUGH, is very good for fenny lands, ſubject to weeds and ſedges, but free from ſtones.

Suſſex Single Wheel PLOUGH, is very wide in the breech, ſo that the draught of it muſt be very hard.

Coxton or *Trenching* PLOUGH, a plough invented to cut drains about Caxton in Cambridgeſhire, in ſtiff miry clay grounds. It has two coulters, one before the other, which, bending inwards, cut each ſide of the trench, which is a foot wide at bottom, a foot and a half at top, and a foot deep; this plough is drawn by 20 horſes.

Dray PLOUGH, is the moſt common: it is made without wheel or foot, of an eaſy draught, beſt in winter for miry clays, where the land is ſoft.

Spaniſh PLOUGH, is a kind of ſemicircle, pitched on one end, with the convex ſide turned to the ploughman, and the concave ſide a little inclined to the horſe: its tail is in a right line with the ſhare. With this plough and one horſe, the Spaniards plow two or three acres in a day.

Colcheſter PLOUGH, is a fine light-wheel plough, which with two horſes will cut up two acres of their land in a day. It has an iron earth-board made rounding, which turns the turf better than any other plough.

One-wheel PLOUGH, may be uſed in any ground

Double PLOUGH; in this there is one plough fixed to the ſide of another, ſo that by means of four horſes and two men a double furrow is ploughed. Add to theſe another kind whereby two furrows are plowed at once, one under another, whereby the earth is ſtirred up 12 or 14 inches deep.

PLOUGH, among bookbinders, is a tool with which the leaves of books are cut ſmooth.

PLOUGHING, one of the principal operations in agriculture, performed by the plough.

This is principally either of lays or of fallows.

PLOUGHING *of Lays*, is the firſt cutting up of graſs-ground for corn; which is uſually done in January, when the earth is wet, and the turf tough, ſo as to hold turning without breaking.

PLOUGHING *of Fallows*, or *Fallowing*, is a preparing of land by ploughing, long before it be plowed for ſeed. This is a conſiderable benefit to lands, few of which will bear above two crops ſucceſſively without ſuch reſpite. There are commonly three fallowings; the firſt is, as ſoon as the huſbandman have done ſowing; and this is to be very ſhallow, well turned, and clapped cloſe together: the ſecond is in June, when they go to the full depth; the third, about the beginning of Auguſt. If it riſe full of clods, they harrow it down: but ſoon ſtrick-ſize, or plow it up again into ridges.

In Staffordſhire, beſides the three ſummer fallowings, they give their land a winter fallowing. This plowing of land four times Virgil recommends:

Illa ſeges demum votis reſpondet avari
Agricolæ, bis quæ ſolem, bis frigora ſenſit. Geor. l. 1.

This is an ancient piece of huſbandry, witneſs thoſe verſes of Virgil:

Alternis idem tonſas ceſſare novales
Et ſegnem patiere ſitu dureſcere campum. Id. lib. 1.

PLUMAGE, denotes the feathers of birds; in falconry, it more particularly denotes the feathers under a hawk's wing, as alſo a parcel of feathers which falconers give their hawks to make them caſt.

PLUMB-LINE, among artificers, denotes a perpendicular line, ſo called, becauſe uſually deſcribed by means of a plummet.

PLUMB-TREE, *Prunus*, a genus of trees whoſe flower conſiſts of five roundiſh concave petals, inſerted in the cup with upwards of 20 ſtamina: the fruit is either an oval or roundiſh drupe, with a longitudinal furrow, containing a compreſſed and acute pointed nut, with the ſutures ſtanding out each way in an edge.

The plumb-tree, it is ſaid, is a native of Armenia, and the country about Damaſcus, from whence they were firſt brought to Italy, and from thence to the other European countries.

As there are a conſiderable number of ſorts of plumbs, we ſhall only mention a few of the beſt. 1. The perdigron plumb. 2. The violet perdigron. 3. The white perdigron. 4. The myrobalan. 5. The green gage. 6. The drap d'or. 7. St. Catherine. 8. Mirabelle. 9. The damaſk violet. 10. The Orleans; this is the moſt common. 11. The imperial. 12. The mogul; theſe two laſt are good for baking, or ſweet-meats: to which may be added ſeveral other ſorts, together with the damſon, ſloe, black and white bullace, which grow in the hedges, and are fit for tarts, the damſon in particular. They are propagated by inoculation, on wild plumb ſtocks, and may be trained either for dwarf,

eſpalier, wall, or ſtandard trees. In thoſe years that plumbs are very plenty, and conſequently much eaten by all ſorts of people, fluxes of the belly generally abound, which often turn to bloody fluxes, hence it appears that they always ſhould be eaten with moderation, and ſhould be quite ripe and ſound.

PLUMBAGE, *Plumbago*, *Molybdæna*, in metallurgy, a metalline recrement, ſeparated in the purification of gold or ſilver with lead, and ſticking to the ſides of the furnace. It has the ſame virtue with litharge. It alſo ſeems to have been uſed among the ancients for black-lead.

PLUMBERY, the art of caſting, preparing, and working of lead, and uſing it in buildings, &c. The lead uſed in plumbery, is furniſhed from the lead-works in large ingots called pigs of lead, ordinarily weighing about 100 pounds a piece. As lead melts very eaſily, it is no hard matter to caſt figures hereof by running it into moulds. But the chief article in plumbery is the ſheets and pipes of lead.

Method of caſting large Sheets of Lead. The lead is melted in a large furnace, uſually built with free-ſtone and earth, fortified on the outſide with a maſſive of ſherds and plaiſter. At the bottom is a place ſunk lower than the reſt, wherein is an iron pot to receive what may remain of the metal after the ſheet is run. The furnace is ſo raiſed above the area of the floor, as that the iron pot juſt reſts thereon. They heat the furnace with wood laid in it; that done, they throw in the lead pell-mell with the burning coals to melt. Near the furnace is the table or mould whereon the lead is to be caſt: it conſiſts of large pieces of wood, well jointed and bound with bars of iron at the ends. Around it runs a frame conſiſting of a ledge or border of wood two or three inches thick, and one or two high from the table, called the ſharps. The ordinary width of the tables is from three to four feet, and their length from 18 to 20 feet. The table is covered with fine ſand, prepared by moiſtening it with a water-pot, then working it with a ſtick; and at laſt, to render it ſmooth and even, beating it flat with a mallet, and plaining it with a ſlip of braſs or wood. Over the table is a rake or ſtrike of wood, which bears and plays on the edges of the frame by means of a notch cut in either end thereof; and ſo placed, as that between it and the ſand is a ſpace proportionable to the intended thickneſs of the ſheet; the uſe of this ſtrike is to drive the matter, while yet liquid, to the extremity of the mould. At the top of the table is a triangular iron peel or ſhovel, bearing before on the edge of the table itſelf, and behind on a treſtle ſomewhat lower than the table. Its uſe is in conveying the metal into the mould; and the deſign of its oblique diſpoſition is that it may by that means retain the metal, and keep it from running off at the foreſide, where it has no ledge. Some peels hold 15 or 1600 weight of lead, and even more.

Things being thus diſpoſed, with a large iron ladle they take out the melted lead, coals and all, out of the furnace, and with it fill the iron peel. When full, they take out the coals, and clear the lead with another iron ſpoon pierced like a ſcummer. This done, they hoiſt up the lower part of the peel by its handle; upon which the liquid matter running off, and ſpreading on the mould, the plumber conducts it to the extremity of the table by means of the ſtrike, which the workman paſſes along the ledges, and thus renders the ſheet of an equal thickneſs. The ſheets thus caſt, there remains nothing but to edge them, that is, to render the edges on both ſides ſmooth and ſtraight.

Method of caſting thin Sheets of Lead. The table or mould here uſed is of a length and breadth at diſcretion, only ledged on one ſide. Inſtead of ſand they cover it with a piece of woollen ſtuff, nailed down at the two ends to keep it tight; and over this lay a very fine linen cloth. The feet of the table are uneven, ſo as to be moderately inclined.

Great regard is had to the lead that it have the juſt degree of heat, ſo as to run well, yet not burn the linen: this they judge of by a piece of paper, which, if it take fire in the liquid lead, is too hot; and, if it be not ſhrunk and ſcorched a little, it is not hot enough. The lead being then in its juſt degree, they have a ſtrike different from that above deſcribed, that ſerves both for peel and ſtrike to contain and conduct the liquid lead; being a wooden caſe without any bottom, only cloſed on three ſides: it is pretty high behind, but the two ſides, like two acute angles ſtill diminiſh to the tip, from the place where they are joined to the third or middle piece, where they are of the ſame heighth therewith, namely, ſeven or eight inches high. The width of the middle makes that of the ſtrike, which again makes that of the ſheet to be caſt.

The ſtrike is placed a-top of the table; which is before covered in that part with a paſteboard that ſerves as a bottom to the caſe, and prevents the linen from being burnt, while the liquid lead is pouring in. The ſtrike is ſo diſpoſed on the table, as that the higheſt part looks to the lower end of the table, and the two ſloping ſides to the higher end. The ſtrike is now filled with the proper quantity of lead; which done, two men, one at each table, let the ſtrike deſcend down the table, or elſe draw it down with a velocity greater or leſs, as the ſheet is to be more or leſs thick, its thickneſs ſtill depending on the promptitude wherewith the ſtrike ſlides down the inclining mould.

Theſe ſmooth ſheets of lead are ſometimes uſed between the joints of large ſtones in great buildings, &c.

Method of caſting Pipes without ſoldering. For this purpoſe they have a kind of furnace conſiſting of a large iron caldron ſupported on a pretty high iron ſtand. The caldron is encompaſſed with a maſſive of bricks and loam; only leaving a mouth or paſſage for the conveyance of wood underneath and lighting the fire; and another little aperture behind to ſerve as a vent-hole. In this furnace the lead is melted; and to forward the fuſion, beſides the heating it with a fire underneath, they put in burning faggots along with the metal, which is ſkimmed and laden off with the above-mentioned inſtruments. Near the ſurface is a bench furniſhed at one end with a little mill, and arms or levers to turn it withal. A ſtrong girt, armed with an iron hook at one extremity, is faſtened by the other to the axis of the mill, around which it turns, when in motion. On this bench the moulds of the pipes are placed horizontally, and the mill and girt ſerve to draw out the iron core after the pipe is caſt. The moulds of theſe tubes are of braſs, and conſiſt of two pieces, which open and ſhut by means of hooks and hinges; their inner calliber or diameter is according to the ſize of the pipe to be made, and their length is uſually two feet and a half.

In the middle is placed a core of braſs or iron, ſomewhat longer than the mould, and of the thickneſs of the inner diameter of the pipe. This core is paſſed through two copper rundles, one at each end of the mould, which they ſerve to cloſe; and to theſe is joined a little copper tube, about two inches long, and of the thickneſs of the intended leaden pipe. By means of theſe tubes the core is retained in the middle of the cavity of the mould. The core being in the mould, with the rundles at its two ends, they take up the melted lead in a ladle, and pour it into the mould by a little aperture at one end made in form of a funnel. When the mould is full and the metal cold, they paſs the hook of the girt into a hole at the end of the core, and, turning the mill with the hand, draw out the core. They then open the mould and take out the pipe.

If they deſire to have the pipe lengthened, they put one end thereof in the lower end of the mould, and paſs the end of the core into it; then ſhut the mould again, and apply its rundle and tube as before, the pipe juſt caſt ſerving for a rundle, &c. at the other end. Things being thus replaced, they pour in freſh metal into the mould, thus repeating the operation, till they have got a pipe of the length required.

Pipes made of Sheet-lead ſoldered. The plumbers have wooden cylinders of the length and thickneſs required; and on thoſe they form their pipes, by wrapping the ſheet around them, and ſoldering the edges all along in this manner: after grating the lead well with a grater, they rub reſin over the part thus grated, then pour on it ſome ſolder melted in a ladle, or elſe melt it with a hot ſoldering iron, ſmearing theſe parts where they would not have the ſolder catch with chalk, or the ſoil of the hand. The ſolder which the plumbers uſe is a mixture of two pounds of lead with one of tin.

PLUME, a bunch of oſtrich-feathers made up to ſerve for ornament in funerals, &c.

PLUME, in falconry, is the general colour of the feathers of a hawk, which ſhews her conſtitution.

PLUME, *Plumule*, in botany, a little member of the ſeed of a plant, which becomes the ſtem or trunk thereof. It is incloſed in a cavity formed in the lobes, being almoſt of the ſame colour with the radicle, on whoſe baſis it is ſuſtained. It is the firſt part that appears out of the earth, there being a hole over-againſt it in the membrane of the ſeed, through which it makes its eſcape. At its firſt appearance out of the cavity of the grain, it is called the bud or germ. It is called plume, as conſiſting of ſeveral pieces bound together like a feather. In corn the plume is that which, after the radicle is ſhot forth, ſhoots out towards the ſmaller end of the ſeed; whence ſome call it the acroſpire.

PLUMMET, *Plumb-line*, *Plumb-rule*, an inſtrument uſed by maſons, &c. to draw perpendiculars with, in order to judge whether walls, &c. be upright planes, horizontal, &c.

PLUNGER, in mechanicks, the ſame with the forcer of a pump.

PLURAL, *Pluralis*, in grammar, an epithet applied to that number of nouns and verbs which is uſed when we ſpeak of more than one thing; or that which expreſſes a plurality or number of things. See NUMBER.

PLURALITY, *Pluralitas*, a diſcrete quantity conſiſting of two or a greater number of the ſame kind: thus we ſay a plurality of gods, &c. Hence plurality of benefices, or livings, is where the ſame clerk is poſſeſſed of two or more ſpiritual preferments, with cure of ſouls.

PLUS, in algebra, a character marked thus +, uſed for the ſign of addition. See CHARACTER.

PLUSH, in commerce, &c. a kind of ſtuff, having a ſort of velvet knap, or ſhag, on one ſide, compoſed regularly of a woof of a ſingle woollen thread and a double warp, the one wool, of two threads twiſted, the other goats or camels hair; though there are ſome pluſhes entirely of worſted, and others compoſed wholly of hair.

PNEUMATICKS, called alſo pneumatology and pneumatoſophy, among ſchoolmen, the doctrine and contemplation of ſpirits and ſpiritual ſubſtances, as God, angels, and the human ſoul, in which ſenſe pneumaticks are the ſame with that we otherwiſe call metaphyſicks. See METAPHYSICKS.

PNEUMATICKS is more commonly uſed among us, for that part of natural philoſophy which treats of the nature and properties of the air.

PNEUMONICKS, in pharmacy, medicines proper in diſeaſes of the lungs, in which reſpiration is affected. Of this number are ſulphur, lungwort, hyſſop, ground-ivy, and colt's-foot: they are uſed in phthiſes, aſthmas, peripneumonies, pleuriſies, &c.

POA, in botany, a genus of the triandria digynia claſs. The calix has two valves including ſeveral flowers; the ſpike is oval, with pointed valves. There are 20 ſpecies, 12 of them natives of Britain.

POCKET, in the wollen trade, a word uſed to denote a larger ſort of bag, in which wool is packed up to be ſent from one part of the kingdom to another. The pocket contains uſually 2500 weight of wool.

POD, among botaniſts, a term uſed to expreſs a pericarpium conſiſting of two valves, which open from the baſe to the point, and are ſeparated by a membranaceous partition, from which the ſeeds hang by a kind of funiculus umbilicalis.

PODAGRA, in medicine, the gout in the feet.

POEM, a compoſition in verſe of a proper length and meaſure.

POESY, *Poeſis*, the ſame with POETRY; which ſee.

POET, *Poeta*, an author who compoſes poems. See POETRY.

POETICAL, *Poeticus*, ſomething relating to poets or poetry. Moſt languages have their poetical words, which are never uſed upon other occaſions; whereby the poets are enabled to raiſe the diction into the poetical character with the greater eaſe.

For want of a ſet of ſuch words in the French language, their poetry appears in a too familiar garb; and it is too reſerved, not being allowed any flights but what might paſs in proſe.

POETICAL *Juſtice*, in the drama, denotes a diſtribution of rewards and puniſhments to the ſeveral perſons, at the cloſe of the piece, according to their ſeveral characters. It is controverted whether this piece of juſtice be indiſpenſable, and, whether it may not be allowed to leave virtue oppreſſed, and vice flouriſhing.

POETICAL *riſing* and *ſetting*. The ancient poets, referring the riſing, &c. of the ſtars to that of the ſun, make three kinds, namely, coſmical, acronical, and heliacal; each of which ſee.

POETICKS, *Poetice*, the laws and rules of conducting pieces of poetry. Ariſtotle's poeticks is a work infinitely valued, and M. Dacier's comment thereon is one of his beſt pieces. Horace, Nida, Voſſius, and Scaliger have likewiſe publiſhed poeticks in Latin; the Duke of Buckingham in Engliſh; and Menardiere, Hedelin, and Boileau, in French.

POETRY, *Poeſy*, the art of compoſing poems, which may be defined, in general, an art of imitating or illuſtrating in metrical numbers every being in nature, and every object of the imagination, for the delight and improvement of mankind. Between imitation and illuſtration there is this difference, that he who beautifully imitates any thing, always illuſtrates it; but not on the contrary. The rules of poetry and verſifying are taught by art, and acquired by ſtudy; but this force and elevation of thought, which Horace calls ſomething divine, and which alone makes the poetry of any value, muſt be derived from nature; or, according to Ariſtotle, from ſome happy tranſports, to which that author gives the name of madneſs. Hence the criticks conclude, the end of poetry is to pleaſe; its cauſe, either the excellence of the poet's genius, or a poetical fury and tranſport of the ſoul, manageable by the judgment; its matter, long and ſhort ſyllables, and feet compoſed hereof, with words furniſhed by grammar; and its form, the arrangement of all theſe things in juſt and agreeable verſe, expreſſing the thoughts and ſentiments of the author after the manner already mentioned. But after all, how narrow are all theſe bounds, if we conſider poetry in the light wherein the works of Virgil and Homer have ſet it. This, which is therefore diſtinguiſhed by the name of the greater poetry, in contradiſtinction to the low and ſimple, or verſification, conſiſts principally in fiction, or the invention of fables, in the expreſſing of things by allegories, and metaphors, and in the inventing of actions, under which the truths which the poet has to teach, may be agreeably diſguiſed. See IDYLLION, and EPICK POEM.

POINT, in geometry, according to Euclid, is a quantity which has no parts, being indiviſible; and, according to Wolfius, that which terminates itſelf on every ſide, or which has no boundaries diſtinct from itſelf. This is a mathematical point, and is only conceived by the imagination; yet herein all magnitude begins and ends, its flux generating a line, that of a line a ſurface, &c. A line can only cut another in a point.

Proportion of Mathematical POINTS. It is a current maxim, that all infinites, whether infinitely great, or infinitely ſmall, are equal: but Dr. Halley ſhews ſeveral infinite quantities which are in a finite proportion to one another, and ſome infinitely greater than others. The like the honourable Mr. Robarts ſhews of infinitely ſmall quantities, viz. mathematical points: he demonſtrates that the points of contact between circles and their tangents are in a ſubduplicate proportion to the diameters of the circles; that the point of contract between a ſphere and a plane is infinitely greater than that between a circle and a tangent; and that the points of contact in ſpheres of different magnitude are to one another, as the diameters of the ſpheres.

POINT *of contrary Flexure*, in the higher geometry, is a point of a curve, wherein it is bent or inflected towards a point contrary to that it before tended towards. If the curve turn back again towards the point whence it firſt ſet out, this point of flexure is called the point of regreſſion or retrogradation.

POINT, in phyſicks, is the leaſt ſenſible object of ſight, marked with a pen, point of a compaſs, &c. This is called a phyſical point, which, in reality, has parts, though not here regarded. Of ſuch points all phyſical magnitude conſiſts. This is what Mr. Locke calls the point ſenſible, and which he defines the leaſt particle of matter or ſpace which we can diſcern, and which, to the ſharpeſt eye, ſays he, is ſeldom leſs than thirty ſeconds of a circle, whereof the eye is the centre.

POINT, in grammar, a certain character uſed to mark the

the divifions of a difcourfe. See CHARACTERS *in Grammar.*

The comma (,) ferves to diftinguifh nouns, verbs, adverbs, and the parts of a period, not neceffarily connected together. The full point or full ftop (.) fignifies that the period is complete, and the fenfe quite finifhed. The colon (:) denotes that the fenfe is not fo complete as the point expreffes it. The femicolon (;) fhews the fenfe to be lefs perfect than the colon, and more fo than the comma.

The comma need not be put between two very fhort phrafes, efpecially if they be governed in the fame manner, and connected by a conjunction; but if two phrafes connected by a conjunction are fomewhat longer, efpecially if their manner of being governed is different, the comma muft then be inferted.

When the laft of the phrafes expreffed in a period gives no expectation of another, the period is ended, and there a full point muft be placed.

In fuch periods as have a member, which may be termed fupernumerary, it being a part of which no expectation is given by what preceded, and which yet depends on it, then the full point muft not be put till after this fupernumerary member.

Before thefe fupernumerary members muft be placed a mediate point, either the colon or femicolon: and thefe are diftinguifhed by a conjunction, as yet, neverthelefs, but, except that. In the fupernumerary phrafe, the colon difcovers a meaning more difengaged from what precedes, and a greater occafion of taking breath; and fhould therefore, rather than the femicolon, be put before conjunctions adverfative, reftrictive, conditional, &c.

The mark of interrogation (?) is put after a period containing a queftion; and that of admiration (!) after one expreffing aftonifhment.

In fhort, what care fo ever be employed in obfervations on pointing, it will ftill be liable to difficulties, which are impoffible to be wholly prevented. Thefe rules may, however, in general, be of fervice to determine in cafes where affiftance is much wanted.

POINTS, or *Vowel Points*, in the Hebrew learning, are certain characters, which, in the writings of that language, ferve to mark the vowels.

POINT, in mufick, a note anciently ufed to diftinguifh the tones. Hence, it is ftill called fimple counter-point, when a note of the bafs anfwers precifely to that of the treble; and figurative counter-point, when a note is fyncopated, and one of the parts makes feveral inflexions of the voice or tone, while the other only makes one.

A point, among us, added to a femi-breve, inftead of two minims, makes it equal to three.

POINT, in aftronomy, is applied to certain places marked in the heavens, and diftinguifhed by proper epithets.

The four grand points of the horizon, eaft, weft, north, and fouth, are called cardinal points. The zenith and nadir are the vertical points. The points wherein the orbits of the planets cut the plane of the ecliptick are called the nodes. The points wherein the equator and ecliptick interfect are called the equinoctial points; particularly that whence the fun afcends to the north pole, the vernal point; and that by which he defcends to the fouth pole, the autumnal point.

The points of the ecliptick where the fun's afcent above the equator, and defcent below it, terminate, are called the folftitial points; the former the eftival or fummer point, the latter the brumal or winter point.

POINTS *of the Horizon* or *Compafs*, in navigation and geography, are certain points formed by the interfections of the horizon with the vertical circles. The number of thefe points is really infinite, though in practice we only diftinguifh 32 of them: thefe are fhewn by right lines drawn from a point affumed in a horizontal plane. Each point is an arch of 11° 15′, which is fubdivided into half and quarter points. Thefe points of the compafs are divided into cardinal and collateral.

Cardinal POINTS, *Cardines Mundi*, are the interfections of the horizon and meridian, called the north and fouth points; and the interfections of the horizon with the prime vertical, called the eaft and weft; and they are a quadrant, or 90° diftant from each other.

Collateral or *intermediate* POINTS, are thofe lying between the cardinal points, which are either primary, namely, thofe equidiftant from the cardinals, as north-eaft, fouth-weft, &c. or fecondary; which are again either of the firft order, namely, fuch as are equidiftant from a cardinal and the next primary, as north-north-eaft; or of the fecond order, that is equidiftant between a primary and firft fecondary, as north-eaft by north.

The primary collateral points, therefore, are 45° diftant from the cardinals; the firft fecondaries 22° 30′ from the cardinal and next primary collateral, &c.

POINT, among feamen, alfo denotes a cape or headland, jetting out into the fea.

POINT, is alfo an iron or fteel inftrument, ufed with fome variety in feveral arts.

Engravers, etchers, cutters in wood, &c. ufe points to trace their defigns, on the copper, wood, ftone, &c.

POINT, in the manufactories, is a general term, ufed for all kinds of laces, wrought with the needle; fuch are the point de Venice, point de France, point de Genoa, &c. which are diftinguifhed by the particular œconomy and arrangement of their points.

POINT, in poetry, denotes a lively brifk turn or conceit, ufually found or expected at the clofe of an epigram.

POINT-BLANK, in gunnery, denotes the fhot of a gun levelled horizontally.

POINTED, in heraldry. A crofs pointed, is that which has the extremities turned off into points by ftraight lines.

POINTING, in grammar, the art of dividing a difcourfe, by points, into periods and members of periods, in order to fhew the proper paufes to be made in reading, and to facilitate the pronunciation and underftanding thereof.

POINTING, in war, the levelling a cannon, or mortar, fo as to play againft any certain point.

POINTING, among feamen, marking on the chart in what part or place the veffel is.

POINTING *the Cable*, in the fea-language, is untwifting it at the end, leffening the yarn, twifting it again, and making all faft with a piece of marline, to keep it from ravelling out.

POISON, in medicine, a malignant quality in fome animal, vegetable, or mineral body, which renders it hurtful, and even mortal, to thofe who take it.

To POISON *a Piece of Ordnance*, implies the fame as to clog or nail it up.

POISONING, in law, the crime of adminiftering poifon to a perfon whereby he dies. By a law of Henry VIII. it was made a fort of treafon, and the punifhment was to be put alive into a caldron of water, and boiled to death. It is now only felony without benefit of clergy, if the perfon die of the poifon within a year and a day.

POLAR, fomething relating to the poles of the world.

POLAR *Circles*, are two leffer circles of the fphere parallel to the equator, at the diftance 23° 30′ from each pole, particularly denominated from their refpective neighbouring poles, the arctick and antarctick.

POLAR *Dials*, are fuch dials whofe planes are parallel to fome great circle paffing through the poles, or to fome one of the hour circle, fo that the pole is neither elevated above, nor depreffed below the plane. Such dial, therefore, can have no centre; and, confequently, its ftyle, fubftyle, and hour lines are parallel.

POLAR *Projection*, is a reprefentation of the earth or heavens, projected on the plane of one of the polar circles.

POLARITY, the quality of a thing confidered as having poles.

POLE, *Polus*, in aftronomy, one of the extremities of the axis whereon the fphere revolves, according to the Ptolemaick fyftem. Thefe two points, each 90° diftant from the equator, are called the poles of the world.

POLE, in geography, the extremity of the earth's axis, or one of the points on the furface of our globe, through which the axis paffes.

POLE, in fphericks, a point equally diftant from every part of the circumference of a great circle of the fphere, as the centre is in a plain figure; or it is a point 90° diftant from the plane of a circle, and in a line, called the axis, paffing perpendicularly through the centre. The zenith and nadir are the poles of the horizon; and the poles of the equator are the fame with thofe of the fphere.

POLES *of the Ecliptick*, are two points on the furface of

of the ſphere 23° 30′ diſtant from the poles of the world, and 90° diſtant from every part of the ecliptick.

Poles, in magneticks, are two points in a loadſtone, correſponding to the poles of the world; the one pointing to the north, the other to the ſouth. See Magnet.

Pole or *Vertex of a Glaſs*, in opticks, is the thickeſt part of a convex, or the thinneſt of a concave glaſs. If the glaſs be truly ground, the pole will be exactly in the middle of its ſurface.

Pole, *Perch*, or *Rod*, in ſurveying, is a meaſure containing 16 feet and a half, otherwiſe called a rod or perch

Pole, or *polar Star*, is a ſtar of the ſecond magnitude, the laſt in the tail of Urſa minor. Its longitude Mr. Flamſtead makes 24° 14′ 41″; its latitude 66° 4′ 11″. The nearneſs of this ſtar to the pole, whence it happens that it never ſets, renders it of vaſt ſervice in navigation, &c. for determining the meridian line, the elevation of the pole, and, conſequently, the latitude of the place, &c.

POLEMICAL, is applied to books of controverſy, eſpecially thoſe in divinity.

POLEMOSCOPE, in opticks, an oblique kind of proſpective glaſs, contrived for ſeeing of objects that do not lie directly before the eye. It was invented by Hevelius in 1637.

Something of this kind are now known among us, under the name of ogling-glaſſes, or opera-glaſſes, through which one ſees a perſon, in appearing to look at another.

POLICY, or *Polity*, πολιτεια, denotes the peculiar form and conſtitution of the government of any ſtate or nation; or the laws, orders, and regulations, relating thereto.

Policy *of Inſurance of Houſes*, is an inſtrument formed on the model of that for veſſels; whereby a perſon, or community of perſons, take on themſelves the riſks and damages that may befal houſes, their furniture, in whole or in part, &c. from fire, on conſideration of a certain ſum of money to be paid by the aſſuree, according to the terms of the agreement. We have ſeveral ſocieties erected into corporations for that very purpoſe.

Policy *of Inſurance for Lives*, is an inſtrument whereby an aſſurance-broker, or ſociety of perſons erected into a corporation, &c. oblige themſelves to pay a certain ſum of money upon the death of a perſon whoſe life they inſure, in conſideration of the aſſuree's paying down quarterly a guinea, or ſo, to the aſſurers, during the life of the ſaid perſon aſſured.

The policy is under the ſeal of the office, and intitles the aſſignees, heirs, or executors, &c. of the perſon in whoſe favour it was granted, to make good the claim, according to the tenor of the articles or by-laws of the ſociety.

POLISHER, or Burnisher, an inſtrument uſed for poliſhing and burniſhing gold, ſilver, and other metals, when gilt or ſilvered, or any other matters proper to take a poliſh.

The gilders uſe an iron poliſher to prepare their metals before gilding, and the blood-ſtone to give them the bright poliſh after gilding.

The poliſher uſed by the maker of ſpurs and bits, &c. is partly iron, partly ſteel, and partly wood; it conſiſts of an iron bar with a wooden handle at one end, and a hook at the other, to faſten it to another piece of wood held in the viſe, while the operator is at work. In the middle of the bow, withinſide, is what is properly called the poliſher, being a triangular piece of ſteel with a tail, whereby it is rivetted to the bow.

The poliſhers, among cutlers, are a kind of wooden grind-ſtones made of walnut-tree, about an inch thick, and of a diameter at pleaſure, which are turned round by the great wheel; upon theſe they ſmooth and poliſh their works with emery and putty.

The poliſhers for glaſs conſiſt of two pieces of wood; the one flat covered with old hat, the other long and half-round faſtened on the former, whoſe edge it exceeds on both ſides by ſome inches, which ſerve the workmen to take hold of and to work backwards and forwards by.

The poliſhers, uſed by ſpectacle-makers, are pieces of wood a foot long, ſeven or eight inches broad, and an inch and a half thick, covered with old beaver hat, whereon they poliſh the ſhell and horn-frames their ſpectacle-glaſſes are to be ſet in.

POLISHING, the art of giving a gloſs to a thing, as a precious ſtone, marble, glaſs, mirrour, &c.

Polishing *and grinding of Glaſſes*, &c. In order to grind plate-glaſs, they lay it horizontally upon a flat ſtone table, made of a very fine-grained free-ſtone; and, for its greater ſecurity, they plaiſter it down with lime or ſtucco: for, otherwiſe, the force of the workmen, or the motion of the wheel with which they grind, would move it about. This ſtone table is ſupported by a ſtrong frame made of wood, with a ledge quite round its edges, riſing about two inches higher than the glaſs. Upon this glaſs, to be ground, is laid another rough glaſs, not above half ſo big, and ſo looſe as to ſlide upon it; but cemented to a wooden plank to guard it from the injury it muſt otherwiſe receive from the ſcraping of the wheel, to which this plank is faſtened; and from the weights laid upon it to promote the grinding, or triture of the glaſſes. The whole is covered with a wheel made of hard light wood about ſix inches diameter; by pulling of which backwards and forwards alternately, and ſometimes turning it round, the workmen, who always ſtand oppoſite to each other, produce a conſtant attrition between the two glaſſes, and bring them to what degree of ſmoothneſs they pleaſe, by firſt pouring in water and coarſe ſand; after that a finer ſort of ſand, as the work advanceth; till at laſt you muſt pour in the powder of ſmalt. As the upper or incumbent glaſs poliſhes and grows ſmoother, it muſt be taken away, and another from time to time put in its place.

This engine is called a mill by the artiſts, and is uſed only in the grinding of the largeſt ſize glaſſes: for, in the grinding of the leſs glaſſes, they are content to work without a wheel, and to have only four wooden handles faſtened to the four corners of the ſtone which loads the upper plank, by which they work it about.

When the grinder has done his part, who finds it very difficult to bring the glaſs to an exact plainneſs, it is turned over to the care of the poliſher, who, with the fine powder of Tripoli ſtone or emery, brings it to a perfect evenneſs and luſtre. The inſtrument made uſe of in this branch, is a board furniſhed with a felt and a ſmall roller, which the workman moves by means of a double handle at both ends. The artiſt, in working of this roller, is aſſiſted by a wooden hoop or ſpring, to the end of which it is fixed; for the ſpring, by conſtantly bringing the roller back to the ſame points, facilitates the action of the workman's arm.

Explanation of plate LXV. *repreſenting the manner of poliſhing glaſs.*

The lower compartment of the plate repreſents a glaſs-poliſher's ſhop, with the men at work.

Fig. 1. The poliſhing table. A, A, the table. B, B, the croſs pieces. C, C, the legs, or ſupporters of the table. D, D, blocks of hard free-ſtone. E, E, plates of glaſs. F, F, the poliſhers. G, G, the handles of the poliſhers. H, H, &c. the ſprings. I, I, the bends or joints in the ſprings. K, the ſhelf, or ſuperior table. L, L, the ſupporters of the ſhelf.

Fig. 2. The glazing-ſtone. A, the ſtone; B, the plate of glaſs.

Fig. 3. The veſſel containing the emery, tripoli, &c. A, the veſſel; B, the ſpatula for taking it out.

Fig. 4. The ſuperior part of the ſpring. A, the upper extremity; B, the point where it is joined to the inferior or lower part.

Fig. 5. The lower part of the ſpring. A, the part where it is joined to the poliſher; B, the place where it is joined to the upper part.

Fig. 6. The box or hoſe by which the two parts of the ſpring are joined together.

Fig. 7. The needle of the ſpring. A, its head; B, its point.

Fig. 8. A bruſh.

Fig. 9. The poliſher. A, the groove for the handle.

Fig. 10. The handle.

Fig. 11. A poliſher covered with cloth.

POLITICAL, ſomething relating to policy or civil government.

Political *Arithmetick*, is the application of arithmetical calculations to political ſubjects, as the publick revenues, number of people, extent and value of lands, taxes, trade, manufactures, &c. of any common wealth.

Major Grant, in his obſervations on the bills of mortality, computes that there are 39,000 ſquare miles of land in England; that in England and Wales there are

4,600,000

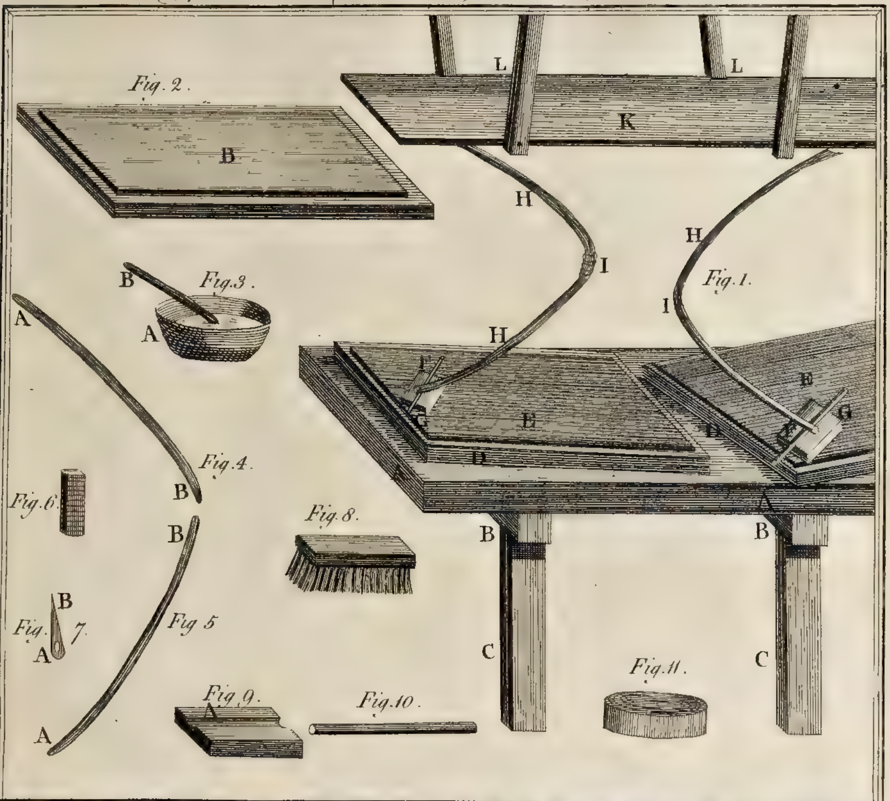


Plate LXV

facing Polishing.

4,600,000 fouls; that the people of London are about 640,000, and one fourteenth part of the people of England. That in England and Wales are about 10,000 parifhes, and 25,000,000 of acres, being about 4 acres to every head. That but 64 out of a hundred of the children born are living at 6 years old; but 40 at 16; but 25 at 26; but 16 at 36; but 10 at 46; but 6 at 56; but 3 at 66; but 1 at 76. And that London doubles itfelf in about 64 years.

Sir William Petty, in his difcourfe about duplicate proportion, fays, that it is found by experience that there are more perfons living between 16 and 26 than of any other age; and thence he infers that the fquare roots of every number of men's ages under 16 fhew the proportion of the probability of fuch perfons reaching the age of 70.

Thus, it is 4 times more likely, that one of 16 years of age lives to be 70, than a child of one year old; it is thrice as probable that one of 9 years lives to be 70, as fuch a new-born child, &c. That the odds is 5 to 4, that one of 25 dies before one of 16; and fo on as the fquare roots of the ages.

Dr Halley has made a very exact eftimate of the degrees of the mortality of mankind from a curious table of the births and burials at the city of Breflau, the capital of Silefia, with an attempt to afcertain the price of annuities upon lives. See the *Philofophical Tranfactions*.

From the whole he makes the two following very good obfervations: 1. How unjuftly we ufe to complain of the fhortnefs of our lives; for that it appears that one half of thofe that are born, do not live above 17 years; and, 2. That the growth and increafe of mankind is not fo much ftinted by any thing in the nature of the fpecies, as it is from the curious difficulty moft people make of venturing on the ftate of marriage; and therefore, that celibacy ought to be every way difcouraged by all wife governments; and thofe who have numerous families of children encouraged by good laws, fuch as the jus trium liberorum, &c. among the Romans.

POLITICKS, *Politice*, is a part of ethicks, and confifts in the governing of ftates, for the maintenance of the publick fafety, order, and good morals.

POLIUM, Poley, a medicinal plant, which is an ingredient in the treacle of Andromachus.

It refifts putrefaction, provokes urine, removes obftructions of the menfes, and cures the jaundice. An infufion of the leaves and flowers is beneficial in lethargick diforders, and, confequently, in epilepfies. What the polium of the ancients was, we know not. It is faid to be beneficial againft the bites of poifonous animals.

POLLARD, among hunters, a ftag or male deer, which has caft his head.

Pollard, *Pollenger*, in agriculture, denotes fuch trees as have been frequently topped, in contradiftinction to timber-trees.

POLLEX, in anatomy, denotes either the thumb or great toe, according as either manus or pedis is added to it.

POLLUTION, in general, fignifies defilement, or the rendering a perfon, or place, unclean or unholy.

Pollution, in medicine, a difeafe which confifts in an involuntary emiffion of the feed in the time of fleep.

POLLUX, in aftronomy, a fixed ftar of the fecond magnitude in the conftellation Gemini, or the twins.

The fame name is alfo given to the hindermoft twin, or pofterior part of the fame conftellation.

POLVERINE, in commerce, the afhes of the herb kali, preferved for the ufe of making glafs.

POLIACANTHA, in botany, the fame with the carduus, or thiftle; which fee.

POLYADELPHIA, the name of the 18th clafs in the Linnæan fyftem of botany, and confifts of fuch plants whofe flowers are hermaphrodite, and furnifhed with feveral fets of united ftamina in each. Of this clafs is the citron, orange, lemon, St. John's-wort, &c.

POLYANDRIA, the name of the 13th clafs of plants in the Linnæan fyftem of botany; comprehending fuch plants whofe flowers are hermaphrodite, and furnifhed with many ftamina, or male parts, in each; thefe always exceed the number of 20, and are inferted in the receptacle. To this clafs belong the piony, larkfpur, aconite, columbine, helebore, with feveral other genera; the fruits of fome of them are of a poifonous quality.

POLYANTHUS, in botany, a beautiful garden flower of the primrofe kind; the varieties of this are innumerable, being produced from feeds, which fhould be fown in February, either in borders, boxes, or pots, and fhould have an eaft afpect, fo as to be fhaded from the heat of the day; in May they will be fit to be planted out for good, which fhould be in a fhady border of ftrong rich earth, at about fix inches afunder, and the fucceeding fpring they will fhew their bloffoms, when their goodnefs may be judged of.

As the properties of a good polyanthus are fimilar to thofe of the auricula, we, therefore, to prevent repetition, refer the reader to the article Auricula, where they are fully explained.

POLYCHREST, in pharmacy, a medicine that ferves for many ufes, or that cures many difeafes.

Sal Polychrest, a compound falt, made of equal parts of falt-petre and fulphur, laid on a red-hot crucible.

POLYCNEMUM, in botany, a genus of plants, whofe flower hath no corolla; the cup is formed of five erect, lanceolated, pointed leaves, with three capillary filaments, topped with obtufe antheræ: the feed, which fucceeds the flower, has fcarce any covering, or at moft, only a very thin membrane.

POLYGALA, milk-wort, in botany, a genus of plants, producing papilionaceous flowers; the fruit is a turbinated heart-fhaped capfule, with two cells and two valves, each containing an ovate feed.

The polygala-vulgaris grows naturally in many parts of England; it hath a perennial woody root, with three or four trailing herbaceous ftalks, furnifhed with linear fpear-fhaped leaves; the flowers are produced at the top of the ftalks, and are of a blue, purple, or white colour.

It is fuppofed, that cattle which feed on this plant, give a greater quantity of milk than ufual; and therefore it is reckoned good for nurfes for the fame purpofe.

Polygala Virginiana, rattle-fnake-root, is a fpecies of the former: it grows naturally in many parts of North-America. The root of this plant is perennial, and compofed of feveral flefhy fibres, varioufly bent or contorted; it is yellowifh without, but white within, and has an acrid bitterifh tafte, but fomewhat aromatick: from the root arife three or four branching ftalks, which grow erect, upwards of a foot high, and furnifhed with oblong, fpear-fhaped leaves, placed alternately; the flowers are produced in loofe fpikes at the ends of the branches; thefe are fmall and of a white colour.

The root of this fpecies is looked upon, in America, as a fpecifick againft the bite of the rattle-fnake, and has been long ufed by the Senega Indians for that purpofe, which, if taken in time, is an infallible remedy: the Indians, when they travel in the woods, carry about them this root in powder, left they fhould be bit by the rattle-fnake, and whenever this happens, they take a quantity of the powder inwardly, and apply fome of it to the part bitten, which is a certain cure, and of late years it hath been ufed by the inhabitants of Virginia in many diforders, which are occafioned by a thick fizy blood; fo that the root of this plant, when its virtues are fully known, may become one of the moft ufeful medicines yet difcovered.

POLYGAMIA, in botany, the name of the 23d clafs of plants in the Linæan fyftem; comprehending thofe which produce (either upon the fame or different plants) hermaphrodite flowers, and alfo flowers of one fex only, be it male or female, or flowers of each fex.

Of this clafs there are three orders or fubdivifions, whereof the firft confifts of fuch polygamious plants as contain the different kinds of flowers on different parts of the fame plant, and hence called polygamia-monœtia; fuch are the plantain-tree, white helebore, maple, orach, &c. The fecond order comprehends fuch polygamious plants as have their different flowers not on the fame individual plant, but on diftinct ones of the fame fpecies, and hence called polygamia-diœcia; of this order are the afh, amber-tree, ginfeng, &c. The third order, called polygamia-triœcia, comprehends fuch plants as have the polygamy on three diftinct plants; this order contains but one genus, which is the fig-tree.

POLYGAMY, a plurality of wives or hufbands, in the poffeffion of one man or woman, at the fame time.

POLYGLOTT, πολυγλωττος, among divines and criticks, chiefly denotes a bible printed in feveral languages.

In these editions of the holy scriptures, the text in each language is ranged in opposite columns. The first polyglott bible was that of Cardinal Ximenes, printed in 1517, which contains the Hebrew text, the Chaldee paraphrase on the Pentateuch, the Greek version of the LXX. and the ancient Latin version. After this, there were many others, as the bible of Justiniani, bishop of Nebio, in Hebrew, Chaldee, Greek, Latin, and Arabick; the Psalter by John Potken, in Hebrew, Greek, Ethiopick, and Latin; Plantin's polyglott bible, in Hebrew, Chaldee, Greek, and Latin, with the Syriack version of the New Testament; M. le Jay's bible, in Hebrew, Samaritan, Chaldee, Greek, Syriack, Latin, and Arabick; Walton's polyglott, which is a new edition of Le Jay's polyglott, more correct, extensive, and perfect, with several new oriental versions, and a large collection of various readings, &c.

POLYGON, in geometry, a figure with many sides, or whose perimeter consists of more than four sides at least: such are the pentagon, hexagon, heptagon, &c. See PENTAGON, HEXAGON, &c.

POLYGON, in fortification, denotes the figure of a town, or other fortress. The exterior or external polygon is bounded by lines drawn from the point of each bastion, to the points of the adjacent bastions. And the interior polygon is formed by lines joining the centres of the bastions.

Line of POLYGONS, on the French sectors, is a line containing the homologous sides of the first nine regular polygons inscribed in the same circle; that is, from an equilateral triangle, to a dodecagon.

POLYGONAL NUMBERS, are so called, because the units whereof they consist may be disposed in such a manner, as to represent several regular polygons. See the article NUMBER.

The side of a polygonal number is the number of terms of the arithmetical progression that compose it; and the number of angles is that which shews how many angles that figure has, whence the polygonal number takes its name.

POLYGONATUM, Solomon's seal, in botany, is ranked by Linnæus among the convallaria. See CONVALLARIA. The root of this plant is a famous vulnerary; for being applied in form of a poultice, it not only heals fresh wounds, but takes away the marks of bruises, &c.

POLYGONUM, knot-grass, in botany, a genus of plants, whose flower is apetalous, but the cup is of a turbinated form, coloured within-side, and divided into five oval segments at the limb; there is no pericarpium, but the seed, which is single, three-cornered, and pointed, is contained in the cup.

To this genus Linnæus has joined the bistorta, persecaria, and fagopyrum of Tournefort. An infusion of the common knot-grass is a valuable astringent medicine in hæmorrhages of all kinds.

POLYGYNIA, among botanists, an order or subdivision of a class of plants in the Linnæan system, comprehending such plants of that class as have a great number of pistils, or female organs of generation. See PISTIL and GENERATION.

POLYHEDRON, in geometry, denotes a body or solid comprehended under many sides or planes.

A gnomonick polyhedron is a stone with several faces, wherein are described various kinds of dials. See DIAL.

POLYHEDRON, polyscope, in opticks, is a multiplying-glass, or lens, consisting of several plane surfaces disposed into a convex form. See LENS.

POLYHISTOR, a person of great and various erudition; whence

POLYMATHY, πολυμαθια, denotes the knowledge of many arts and sciences.

POLYMYTHY, πολυμυθια, in poetry, a fault in an epick poem, when instead of a single mythos, or fable, there is a multiplicity of them.

POLYNOMIAL, or MULTINOMIAL, in algebra. See MULTINOMIAL.

POLYOPTRUM, in opticks, a glass through which objects appear multiplied, but diminished.

POLYPE, or POLYPUS, in zoology, a small fresh-water insect of a cylindrick figure, but variable, with very long tentacula.

POLYPODY, *Polypodium*, in botany, a plant with long leaves issuing from the root, divided on both sides, down to the rib, into a number of oblong segments broadest at the base: it has no stalk, or manifest flower; the seeds are a fine dust, lying on the backs of the leaves, in roundish specks, which are disposed in rows parallel to the rib: the roots are long and slender, of a redish brown colour on the outside, greenish within, full of small tubercles, which are resembled to the feet of an insect, whence the name of the plant. It grows in the clefts of old walls, rocks, and decayed trees: that produced on the oak has been generally accounted the best, though not sensibly different from the others. It is found green at all seasons of the year.

The leaves of polypody have a weak ungrateful smell, and a nauseous sweet taste, leaving a kind of roughness and slight acrimony in the mouth. This root is supposed to be aperient, resolvent, and expectorant: it was formerly ranked among the purgatives, but operates so weakly, a decoction of an ounce or two scarcely moving the belly, that it has long been expunged from that class: the present practice pay very little regard to it in any intention.

POLYPUS, or POLYPUS *of the Heart*, in medicine, a mass composed of various pellicles and fibres generated in the heart and large vessels.

Polypuses are generally found in acute as well as chronick diseases. Their principal seat is in the heart, pulmonary artery, and the aorta. They chiefly attack the sanguine constitutions, and such as have small vessels and soft fibres; those who are of a sedentary life, who drink much, or are free in the use of acid wines and spirituous liquors, or who eat great suppers.

POLYPYRENEOUS, an appellation given to fruits containing several kernels or seeds.

POLYSCOPE, in opticks, the same with polyhedron. See POLYHEDRON.

POLYSPASTON, in mechanicks, a machine consisting of an assemblage of several pullies; for the nature and force of which, see PULLEY.

POLYSPERMOUS, in botany, denotes such plants as have more than four seeds succeeding each flower, without any certain order or number.

Polyspermous herbs are subdivided into, 1. such as have a calyx or perianthum; and, 2. into such as have none.

POLYSYLLABICAL ECHOES, are such echoes as repeat many syllables or words.

POLYSYLLABLE, in grammar, a word consisting of more than three syllables.

When a word consists of one, two, or three syllables, it is called monosyllable, disyllable, or trisyllable.

POLYSYNDETON, a figure in rhetorick, consisting of a superabundance of conjunctions copulative: in opposition to this stands a syndeton.

POLYTHEISM, the belief of a plurality of gods.

POMADA, an exercise of vaulting the wooden horse, by laying one hand over the pommel of the saddle.

POMATUM, an ointment made thus: Take of fresh hog's lard, and beat it into cream with rose water, and scent it with oil of lemons, thyme, or the like. Pomatums are also occasionally perfumed with the odours of jessamines, oranges, jonquils, tuberoses, &c. They are principally used for pimples, and foulnesses of the skin.

POMEGRANATE, *malus Punica*, a medicinal fruit like an apple or quince, full of seeds inclosed within a redish pulp, containing either a sweet vinous juice, or one more acid and acerb.

Pomegranates grow in Spain, Italy, and many other countries, and flower in June, and the fruit is ripe in September. Of the kernels are made syrups and conserves; and the peel which is called malicorium, reckoned very astringent, is an ingredient in several remedies, and ptisans, for dysenteries, diarrhœas, lienteries, hæmorrhages, and relaxations of the gums. The ancients used the rind, as the moderns do sumack, in the preparation of leather. There is but little of the true conserve made; that which ordinarily passes for it being only sugar melted down, to which they give the colour and sharp taste with cochineal, cream of tartar, and alum.

POMEIS, in heraldry, are green roundles; so called by the English heralds, who express different coloured roundles by distinct names. The French call them torteaux vert.

POMIFEROUS, in botany, is applied to those plants

plants which have the largeſt fruit, and covered with a thick hard rind; whereby they are diſtinguiſhed from the bacciferous, which have only a thin rind.

POMMEL, *Pummel*, in the menage, a piece of braſs or other matter a top and in the middle of the ſaddle-bow, to which are faſtened the holſters, ſtirrup-leathers, &c.

POMPHOLYX, in pharmacy, a kind of metalline flower, being a white, light, friable ſubſtance, found adhering to the lid or covercle of crucibles or furnaces, wherein copper is melted with calamine ſtone for the making of braſs.

POMUM ADAMI, in anatomy, a protuberance in the anterior part of the neck, formed by the thyroid cartilage, or firſt cartilage of the larynx, called ſcutiformis.

POND, in geography, a little lake of freſh water, which neither receives nor emits any river.

PONE, a writ in law, whereby a cauſe depending in the county, or other inferior court, is removed to the Common-pleas, or King's-bench, at Weſtminſter.

PONE *per Vadium*, a writ commanding the ſheriff to take ſurety of one for his appearance at a certain day.

PONIARD, a little pointed dagger, very ſharp-edged. It was anciently borne in the hand, at the girdle, or hid in the pocket, but is now ſet aſide, except among aſſaſſins, and at the theatres.

PONS VAROLII, in anatomy, a ſort of arch in the cerebellum, formed by two medullary proceſſes; ſo called from Narolius, a phyſician of Padua, in 1572, who was the firſt obſerver of it. See BRAIN.

PONTAGE, *Pontagium*, a contribution towards the building and repairing of bridges, from which no perſon whatever, in ancient times, was exempted.

It alſo denotes the dues for perſons or merchandizes paſſing over bridges.

PONTIF, *Pontifex*, high-prieſt, a perſon who has the direction and ſuperintendance of divine worſhip, as the offering of ſacrifices, &c. The Romans had a college of Pontifs, and over thoſe a pontifex maximus, inſtituted by Numa. The Jews too had their high-prieſt, and among the Romaniſts the pope is ſtill ſtyled the ſovereign pontif.

PONTIFICAL, *Pontificale*, a book of the rites belonging to pontifs.

PONTIFICALIA, the robes wherein a biſhop performs divine ſervice.

PONTIFICATE, *Pontificatus*, the ſtate or dignity of a pontif. It more peculiarly denotes, in modern writers, the reign of a pope.

PONTON, *Pontoon*, in war, a floating bridge made of boats and planks, for the paſſage of the cavalry, cannon, infantry, &c. over a river, &c. The late invented ponton is made of copper, furniſhed with an anchor, &c. ſeveral of which are diſpoſed two yards aſunder with beams acroſs, and over thoſe are planks, being alſo linked to each other, and faſtened on each ſide the river by a rope run through a ring in each of their heads, and fixed to a tree or ſtake on either ſhore.

The pontones mentioned by Cæſar and Aulus-Gellius were no more than a kind of ſquare flat veſſels, for carrying over horſe, &c.

PONT VOLANT, a *flying Bridge*, a kind of bridge uſed in ſieges, made of two bridges laid over one another, and ſo contrived, by means of cords and pullies placed along the ſides of the under bridge, that the upper may be puſhed forward, till it join the place where it is deſigned to be fixed; the whole length of both not to be above five fathom.

POOL, is properly a reſervoir of water ſupplied with ſprings, and diſcharging the overplus by ſluices, wears, &c.

POOP, *Poup*, *Puppis*, in navigation, is the higheſt part of the ſhip's ſtern. In king's ſhips, the outſide of the poop is adorned with galleries, trophies, &c.

POOR, in law, an appellation given to all perſons who are in ſo low and mean a condition as that they either are, or may become a burden to a pariſh.

POPÆ, in antiquity, were inferior miniſters employed in the Pagan ſacrifices, whoſe office was to bring the victim to the altar, tie it thereto, kill it, &c.

POPE, *Papa*, is the ſupreme head of the Romiſh church, whoſe ſee is at Rome, whence he iſſues out his briefs and bulls through the catholick world.

POPLAR, *Populus*, in botany, a genus of trees producing male and female flowers on ſeparate plants, growing in an oblong amentum, looſely imbricated, and compoſed of ſcales which are oblong, plain, and cut at their margin; the corolla has no petals, but conſiſts of a monophyllous nectarium, turbinated at bottom, and tubulated at top; the ſtamina are eight very ſhort filaments, topped with large, tetragonal antheræ. The fruit is an ovate bilocular capſule, containing a number of oval ſeeds covered with a hairy down. There are different ſpecies of this genus, as the white poplar or abele tree, the black poplar, the aſpen tree, the Carolina poplar, &c. They are propagated either by layers, or large cuttings, planted in February, in a moiſt ſoil, where they will readily take root.

The beſt uſe theſe trees can be applied to, is for breaking off the weſterly or northerly winds, and to be planted in ſuch land where ſcarce any other tree will thrive, for the advantage that will ariſe from its timber; for the wood of theſe trees, eſpecially of the abele, is very good to lay for floors, where it will laſt many years; and, for its exceeding whiteneſs, is by many perſons preferred to oak; but being of a ſoft contexture, is very ſubject to take the impreſſion of any thing hard and pointed, which renders it leſs proper for this purpoſe: it is alſo very proper for wainſcotting rooms, being leſs ſubject to ſwell or ſhrink than moſt other ſorts of wood; but for turnery ware there is no wood equal to this, for its exceeding whiteneſs; ſo that trays, bowls, and many other utenſils, are made of it: and the bellows-makers prefer it for their uſe; as do alſo the ſhoe-makers, for heels for womens ſhoes; and of this wood the ſhoes are made which are worn by the peaſants in France; it is alſo very good to make light carts; and the poles are very proper to ſupport vines, hops, &c. and the loppings will afford good fuel.

POPLES, in anatomy, the inner part of a juncture, whereby the thigh bone is articulated with the tibia.

POPLITEA, in anatomy, a name given to the third vein of the leg, ariſing from the heel, where it is formed out of ſeveral branches, coming both from the heel and ancle. It lies pretty deep in the fleſh, and aſcending up to the ham, terminates in the crural vein.

POPPY, *Papaver*, in botany, a genus of plants, whoſe flower conſiſts of four roundiſh, plane, patent petals, narroweſt at the baſe, and alternately ſmaller; the filaments are numerous, capillary, and topped with oblong compreſſed, erect antheræ. The fruit is a large capſule, crowned by a plain ſtigma, and opening in many holes under it; the ſeeds are numerous and very ſmall, and the receptacles are longitudinal plicæ, of the ſame number with the rays of the ſtigmata, and growing to the ſides of the capſule.

Of poppies there are ſeveral ſpecies; thoſe cultivated in gardens are double, and extremely beautiful, vieing with the fineſt carnations for ſtripes and colours, and have nothing to diſcountenance their having a place amongſt the moſt brilliant collection, but their ſhort duration and offenſive ſmell. They are propagated by ſowing the ſeeds in autumn, or early in the ſpring, in the places where they are intended to flower. The heads of the fruit of poppies contain a milky juice, which may be collected in a conſiderable quantity, by ſlightly wounding them when almoſt ripe; this expoſed for a few days to the air, thickens into a clammy maſs, the ſame as opium, which is an extract from the heads of the white or Turkey poppy. See OPIUM. The ſeeds of the white poppy are uſed in emulſions, being cooling, and good in fevers and inflammatory diſtempers, as alſo for the ſtrangury and heat of urine.

POPULEUM, *Populneum*, in pharmacy, an unguent prepared of the buds of black poplar, violet-leaves, navelwort, and lard, bruiſed and macerated; to which are added bramble-tops, leaves of black poppies, mandragora, hen-bane, night-ſhade, lettuce, and burdock, boiled in roſe-water, and ſtrained. It is much uſed for burns, ſcalds, and all ſorts of inflammations, and to aſſuage arthritick pains.

PORCELAIN, *Purcelain*, a fine ſort of earthen ware, chiefly manufactured in China, and thence called china, or china-ware; but brought into Europe chiefly from Japan, Siam, Surat, and Perſia. The Chineſe call it tſe-ki. Porcelain is made chiefly at Kingteching, a large town in the province of Kyangſi. In a letter from F. Dieutrecolles to F. Orry, from Jauchew, dated September

ber 1712, the whole procefs of this manufacture is defcribed as follows:

Materials of Porcelain. There are two kinds of earths, and as many kinds of oils or varnifhes ufed in the compofition of porcelain. The firft earth, called kaulin, is befet with glittering corpufcles; the fecond, called petunfe, is a plain white, but exceedingly fine and foft to the touch. They are both found in quarries, 20 or 30 leagues from Kingteching. The petunfes are brought in form of bricks out of the quarries, where they are naturally pieces of a very hard rock. The white of the beft petunfe is to border a little on green.

The firft preparation is to break and pound thefe bricks coarfely with iron mallets, and then in mortars with peftles: and when the powder is rendered impalpable, they throw it into a large urn full of water, ftirring it about brifkly; when the water has refted a little, they fkim off, from the top, a white fubftance of the thicknefs of four or five fingers, which is put into another veffel of water. They then ftir again the water of the firft urn, and again fkim it, and thus alternately, till nothing remain but the gravel of the petunfes at bottom, which they pound afrefh.

As to the fecond urn, when the water has well fettled, they pour it off, and with the pafte at bottom, fill a kind of moulds; whence, when almoft dry, they take it out, and cut it into fquare pieces, properly called petunfes, referving them to be mixed with the kaulin in the proportion hereafter affigned. Thefe fquares are fold by the hundred, but it is very rare to meet with them unfalfified, the workmen being arrant knaves in their dealings; fo that they are commonly obliged to purify them before they can be employed.

The kaulin, which is the other earth ufed in porcelain, is much fofter than the petunfe, when dug out of the quarry: yet this, by its mixture with the other, gives the firmnefs and ftrength to the work. The mines whence the kaulin is dug are deep, and the matter is found in glebes, like the chalk in ours. The preparation of kaulin is much the fame with that of the petunfes. The oil, or varnifh, which makes the third ingredient, is a whitifh liquid fubftance, drawn from the hard ftone whereof the petunfes are formed; that which is whiteft, and whofe ftains are the greeneft, being always chofen for this purpofe.

The manner of preparing the oil: the petunfes being wafhed, undergo the fame procefs as for making the fquares, only that the fineft part of the matter of the fecond urn is not put in moulds, but taken to compofe the oil. To 100 pounds of this matter they caft a mineral ftone called fhekau, like our allum. This ftone is firft heated red-hot, and fo reduced in a mortar to an impalpable powder; and ferves to give the oil a confiftence, which, however, is ftill to be kept liquid.

The oil of lime makes the fourth ingredient: they firft diffolve large pieces of quick-lime, by fprinkling water thereon; on this powder they lay a couch of dry fern, and on the fern another of the flaked lime, and thus alternately till there be a moderate pile, and then fet fire to the fern. The afhes they divide on new couches of dry fern, fetting them on fire, as before; and this they repeat fucceffively; the oil being ftill the better, as the afhes are oftener burnt.

A quantity of thefe afhes are thrown into an urn full of water; and to every hundred pounds is added a pound of fhekau, which diffolves therein; the reft, as in preparing the petunfes; the fediment found at the bottom of the fecond urn, and which is to be kept liquid, is what they call the oil of lime, and which gives the porcelain all its luftre. This oil is eafily fophifticated with water, and a proportionable quantity of fhekau. Ten meafures of oil of petunfe ufually go to one of lime. To have the mixture juft, the two oils fhould be equally thick.

Forming of Porcelain *Veffels*. The firft thing is to purify the petunfe and kaulin; which is done as in preparing the fquares. For the fecond, it is fufficient to plunge it in an urn full of water in an open bafket: the dregs that remain are perfectly ufelefs, and flung away.

The work-houfes are vaft yards walled round with fheds, and other conveniencies, to work under and live in. There is fcarce a piece of porcelain but paffes through above 20 hands, before it comes to the painters; and above 60, before it is brought to perfection. For the finer porcelains, they ufe equal quantities of petunfe and kaulin; four parts of kaulin to fix of petunfe for moderate ones; and never lefs than one of kaulin to three of petunfe for the coarfeft. The hardeft part of the work is the kneading the two earths in a kind of large bafons or pits well paved and cemented, wherein the workmen trample continually with their feet till the mafs become of the confiftence required to be ufed by the potter. This earth is kneaded piece-meal, with the hands, on large flates. But on this preparation depends the perfection of the work; the leaft heterogeneous body, the leaft vacuity, the fmalleft grain of fand, nay, fometimes a fingle hair, making the porcelain crack, fplinter, run, or warp.

The fmooth pieces of porcelain, as cups, urns, difhes, &c. are made with the wheel; but fuch as are in relievo, as figures of men, animals, &c. are formed in moulds, but fafhioned with the chiffel. The large pieces are made at twice; one half is raifed on the wheel by three or four workmen, who hold it till it has acquired its figure; which done, they apply it to the other half, uniting the two with porcelain earth made liquid, by adding water to it, and polifhing the juncture with a kind of iron fpatula. After the fame manner are joined the feveral pieces of porcelain formed in moulds, or by the hand, and after the fame manner are handles, &c. added to the cups, and other works formed with the wheel.

The moulds are made after the manner of thofe of our fculptors, namely, of divers pieces, which feverally give the refpective figure to the parts of the model, and are afterwards united to form a mould for an entire figure. They are made of a yellow fat earth dug about Kingteching, being kneaded like potter's earth, and when fufficiently mellow, and moderately dry, beating it ftoutly, they form it into moulds. All the works made in moulds are finifhed with feveral inftruments proper to dig, fmooth, and touch up the ftrokes that efcape the mould: there are fome works whereon relievos are added ready made, as dragons, flowers, &c. others that have impreffions en creux; which laft are engraved with a kind of puncheons. In general, all porcelain works are to be fheltered from the cold, their natural humidity making them liable to break when they dry unequally.

A common tea-cup begins with the potter, who, with the wheel, gives it its form, height, and diameter. This operator has not a farthing fterling for a plate furnifhed with 26 cups; accordingly, they go out of his hands very imperfect, efpecially towards the feet, which are afterwards cut with the chiffel, when the cup is dry. From the wheel it is received by a fecond workman, who fits it to its bafe; a third applies it on a mould, which is on a kind of lathe to bring it to its true form. A fourth workman polifhes it with a chiffel about the edges, and brings it to the thinnefs neceffary to make it tranfparent; in doing which, he moiftens it from time to time, left it break. When of its proper thicknefs, another workman turns it gently on a mould to fmooth its infide equably; other workmen add fome ornaments in relievo; others impreffions en creux; others only handles. At laft, the foot on the infide is rounded and hollowed with a chiffel by a particular artift who does nothing elfe.

Painting of Porcelain. The Chinefe painters, efpecially thofe that meddle with human figures, our author obferves, are all forry workmen: he adds, that the defect is fcarce any where fo fenfible as in the whapey, or porcelain painters; among whom, fetting afide flowers and landfkips, which are fometimes tolerable, the greateft mafters are not to be compared to ordinary apprentices among the Europeans for their beauty and juftnefs of defign. But it is otherwife with the colours thefe whapey ufe, which are fo exceeding lively and brilliant, that there is but little hopes that our workmen fhall ever vie with them.

The painting work is diftributed among a great number of workmen, in the fame laboratory: to one it belongs to form the coloured circle about the edges of the porcelain, another traces out flowers, which another paints: this is for waters and mountains alone; that for birds and other animals; and a third for human figures. There are porcelain made of all colours, both with regard to the ground and reprefentations therein. As to the colour of landfkips, &c. fome are fimple;

fuch

ſuch are all blues, ſuch as are ſeen in Europe; others are mixed up of ſeveral teints; and others again heightened with gold.

The blue is made of lapis lazuli prepared by burning it the ſpace of 24 hours in a kiln, where it is buried up in gravel to the height of half a foot; when burnt, they reduce it into an impalpable powder in porcelain mortars, not varniſhed, and with peſtles of the ſame matter.

For the red they uſe coperas, which they call tſaufan; a pound of this they put into a covered crucible, in the lid whereof is left a little aperture, through which the matter, on occaſion, may be ſeen. The crucible is heated with a reverberatory fire, till the black ſmoke ceaſe to aſcend, and a fine red one ſucceeds it. A pound of copperas yields four ounces of red liquor, which is found at the bottom of the crucible, though the fineſt part is that uſually adhering to the lid and ſides of the crucible.

The powder of flintis, likewiſe, an ingredient in moſt of the other colours; e. gr. for green, to three ounces of tongwhapeen, or ſcoria of beaten copper, they uſe half an ounce of powder of flint, and an ounce of ceruſe. Violet is made by adding a doſe of white to the green already prepared: the more green is added, the deeper is the violet. For yellow, they uſe ſeven drachms of white, and three of red copperas. Moſt of theſe colours are mixed up with gum-water, for application; a little ſaltpetre, ſometimes ceruſe or copperas, but, more uſually, copperas alone, being firſt diſſolved in water. Indeed, for porcelains that are to be quite red, the colour is uſually applied with oil, i. e. with the common oil of the porcelain, or another made of the white flints.

There is alſo another red called blown red, becauſe, in reality, applied by blowing with a pipe, one of whoſe orifices is covered with a very fine gauze which is ſmeared; when blowing againſt the porcelain, it becomes all ſprinkled over with little points. This porcelain is very rare, and of great price. Black porcelain, which they call umian, has likewiſe its beauty: this colour has a leady caſt, like metal-burning mirrours, and is uſually heightened with gold. It is made of three ounces of lapis lazuli, with ſeven of the common oil of ſtone; though that proportion is varied as the colour is deſigned to be more or leſs deep. The black is not given the porcelain till it be dry, nor muſt the work be put to the fire till the colour be dry.

The gold is not applied till after the baking, and is rebaked in an oven for the purpoſe. To apply the gold, they break and diſſolve it in water at the bottom of a porcelain, till a thin gilded cloud ariſe on the ſurface: it is uſed with gum-water, and to give it a body, they add three parts of ceruſe to three of gold.

There is, likewiſe, a kind of marbled porcelain, which is made by applying the marblings with the pencil, and for oil to varniſh it withal, uſing that of white flints, which hatches and cuts the work with a thouſand humorous ſtrokes, in manner of moſaic work. The colour this oil gives, is a white ſomewhat aſhy. The porcelain is called tſwiki.

There are ſeveral other kinds of porcelain, but they are rather for curioſity than uſe; the pretrieſt are the magic porcelain, whoſe colours only appear when filled with ſome liquor. Theſe are made double; the outſide is white, and all laid out in compartments; the inſide is a ſolid cup of coloured porcelain; though the cup is ſometimes of glaſs, which has a better affect than porcelain. The ſecret of theſe magic porcelains, which the Chineſe call kiatiſm, is almoſt loſt; yet F. d'Entrecolles has furniſhed us with the following account: the porcelain, to be painted thus, muſt be very thin; and the colours, which in other porcelains are applied on the outſide, are here applied on the inſide. When the colour is dry, they lay over it a light couch of a ſize made of the porcelain earth; by which means the colour is incloſed between two earthen laminæ; when the ſize is dry, they throw oil within the porcelain; and when it has enough, they return it to the mould, and the wheel, to render it as thin and tranſparent as poſſible. When dry, it is baked in the common furnace. The colours here uſed are always the fineſt, and the figures painted are fiſhes, as the moſt ſuitable to the liquor put within them, and in which they ſeem to ſwim.

The ſeveral kinds of porcelains abovementioned being quite painted with their ſeveral colours, and all the colours dry, are to be poliſhed, to prepare them to receive the oil or varniſh; which is done with a pencil of very fine feathers, moiſtened with water, and paſſed lightly over to take off even the ſmalleſt inequalities.

The oiling or varniſhing is the laſt preparation of the porcelain, before it be carried to the oven: this is applied more or leſs thick, and ſeldom or oftner repeated, according to the quality of the work. For thin fine porcelains, they give two very thin touches, to others one, but that one equivalent to the other two. There is a deal of art in applying the varniſh, both that it be done equally, and not in too great quantity. The couches of the inſide are given by aſperſion, i. e. by caſting in as much varniſh as is neceſſary: thoſe on the outſide by immerſion, or by plunging the pieces in a veſſel of oil. It muſt be obſerved, that the foot is not yet formed, but continues in a mere maſs till the work has been varniſhed; it is at length finiſhed on the wheel; and when hollowed, a little circle is painted in it, and ſometimes a Chineſe letter; this painting being dry, the foot is varniſhed, and the work carried to the oven to be baked.

Our curious author omits nothing, not even the dexterity of the people who carry the porcelain to the bakehouſe. He has been frequently ſurpriſed, he tells us, to ſee a man paſs through ſeveral ſtreets full of people, with two very long narrow boards ranged with porcelains on his ſhoulders, ſtill preſerving the equilibrium ſo accurately, as not to do any damage to ſo frail a commodity.

Baking or nealing of PORCELAIN. There are two kinds of ovens uſed in baking of porcelain: large ones, for works that are only to come to the fire once, which is the common way; and ſmall ones for ſuch as require a double baking. The large ones are two Chineſe fathoms deep, and almoſt four wide. They are formed of a mixture of three earths; one whereof, yellow and common, makes the baſis; the two others are ſcarcer, and dug out of deep mines, wherein people can only work in winter. One of them, called lautou, is a very ſtrong, ſtiff earth; the other, youtou, oily.

The ſides and roof of the ovens are ſo thick, that one may lay the hand on them, when the fire is at its height, without danger of burning. At the top of the dome, which is in form of a tunnel, is a large aperture to give vent to the flames and ſmoke, which mount up inceſſantly, as ſoon as fire is once ſet to the oven. Beſide the principal apperture, there are four or five ſmall ones around, which, by being opened and ſhut, ſerve to augment or diminiſh the heat: like the holes in the chemiſts furnaces, called regiſters. The hearth, which takes up the whole breadth of the oven, is placed in front, preciſely againſt the opening of the door, and is two or three feet deep, and two broad; people paſſing over it on a plank, to go into the furnace to range the porcelain.

As ſoon as the fire is lighted, the door is walled up; only leaving an aperture for the conveyance of wood. Laſtly, the bottom of the oven is covered with ſand, wherein part of the firſt porcelain caſes are buried. The oven itſelf is uſually placed at the extremity of a long, narrow veſtible, which ſerves in lieu of bellows, the cold air and wind being thus driven directly in the face of each oven.

Each piece of porcelain, of any note, is diſpoſed, in the furnace, in its ſeparate caſe, or coffin. Indeed, as to tea-diſhes, &c. the ſame caſe ſerves for ſeveral. The caſes are all of the ſame matter with the oven: they have no lids, but ſerve each other mutually, the bottom of a ſecond caſe, fitting into the aperture of the firſt; and thus, ſucceſſively, to the top of each column. Each coffin, which is uſually of a cylindrical form, that the fire may communicate itſelf more equably to the porcelains incloſed, has at bottom a little lay of very fine ſand, covered over with duſt of kaulin, that the ſand may not ſtick to the work; and care is taken that the porcelain may not touch the ſides of the caſe. In the larger caſes, which hold the ſmall pieces, they leave the middle vacant, in regard porcelains placed there would want the neceſſary heat. Each of theſe little pieces is mounted on a little maſs of earth, the thickneſs of two crowns, covered with powder of kaulin.

F. d'Entrecolles obſerves, that the porcelains are put in caſes, to prevent any diminution of luſtre from the

too violent effects of a naked fire; adding, that it is owing to these thick veils, that the beauty, or, as he calls it, the complexion of the porcelains, is not tanned by the heat of the fire.

As fast as the cases are filled, a workman ranges them in the cavity of the furnace; forming them into piles or columns, whereof those in the middle are at least seven feet high. The two cases at the bottom of each column are left empty; because, being partly sunk in the sand, the fire has the less effect on them; and for the same reason, the uppermost one is left empty. In this manner is the whole cavity of the oven filled with columns, excepting that part precisely under the grand aperture.

In ranging the cases, they observe always to place the finest piles of porcelain in the centre; the coarsest at the bottom; and those that are high-coloured, and consist of as much petunse as kaulin, and wherein the worst oil is used, at the mouth.

These piles are all placed very near one another, and are bound together at top, at bottom, and in the middle, by pieces of earth; in such a manner, as that the flame may have a free passage among them, and insinuate equally on all sides: in which a great part of the workman's art lies, and on which the perfection of the porcelain much depends. Another thing to be observed, is, that an oven must never be set altogether with new coffins; but half one, half the other; the old ones at the bottoms and tops of the pile, and the new ones in the middle. Indeed it were better to have them all burnt in an oven apart, before they come to be used for porcelain; as was anciently done. The cases, our author observes, are brought ready prepared from a large village on the river, a league distant from Kingteching. Before burnt, they are yellow: and afterwards of a dark red.

When the oven is filled, they wall up the door; only leaving a little aperture for the throwing in of little pieces of wood, a foot long, but very slender, to keep up the fire. It is then heated, by degrees, for the space of a day and night; after which two men, who relieve one another, continue to throw in wood without any interruption. To know when the porcelain is baked enough, they open one of the less holes of the oven, and with a pair of tongs take off the lid of one of the piles. If the fire appear very brisk and clear, and the piles equally inflamed; and especially if the colours of the porcelains that are uncovered dart forth a noble lustre; the coction is sufficient, they discontinue the fire, and wall up what remained of the door of the furnace.

If the oven be only filled with small porcelains, they take them out 12 or 15 hours after the fire is extinct: if it be filled with larger, they defer opening it for two or three days. In this the modern practice differs from the ancient; wherein the door was not opened till after 10 days for the large pieces, and five for the small ones.

One thing very surprizing, and almost inconceivable, F. d'Entrecolles observes, is, that there are never found any ashes on the hearth of the oven, what quantity of wood soever is consumed. He adds another thing, which with him passes for equally strange, that the workmen employed about the furnaces, slake their thirst, by continually drinking hot tea with salt dissolved in it.

The Chinese make another kind of porcelain, which they paint and bake twice; and for this second baking they have a kind of little ovens on purpose. When very small, they are made of iron; otherwise, of a kind of bricks an inch thick, a foot high, and half a foot broad, made with the same earth as the porcelain cases. The biggest of these ovens does not exceed five feet in height, and three in diameter; and being made much in form of bee-hives, the bricks are arched a little, to form the curvity the better. The hearth is of earth half a foot high, formed of two or three ranges of bricks; and on this mass is the oven built. Around the oven, at the distance of about half a foot, is raised a shell of common bricks, joined to the oven itself, by a kind of arcboutant of earth, which serves to strengthen it. They usually build four or five of these ovens at equal distances from each other. At the bottom of the shell are holes to give air to the fire when lighted: at top is an aperture, which they cover up with a piece of the baked earth, when the porcelains are laid in the oven.

The porcelains, here, are not inclosed in coffins, as in the common ovens; the oven itself serving that purpose, and being so exactly closed, that they receive no other impression of the fire, but that of the heat of the charcoal disposed in the hearth, at the bottom of the oven, as well as at top of the vault, and in the interval between the oven and the shell, or brick wall.

To prepare the porcelains for a second baking, they must have had their varnish in the common manner, and have passed the great oven. In this state they are painted with various colours, after which, without giving them any new varnish, they are ranged in piles in the little oven; setting the little ones over the larger, in form of pyramids.

This second baking is sometimes intended to preserve the lustre of the colours the better, and at the same time to give them a kind of relievo. But, more usually, its design is to hide defective places, by covering them over with colours: but the artifice is easily found out, by passing the hand over them.

When the workman judges his porcelains baked enough, he takes off the piece that covers the aperture; and if the works appear glittering, and the colours glowing, he takes out the charcoal, and when the oven is cold, the porcelain too. How beautiful soever the modern porcelain may be, the taste for antiquity, which reigns in China as well as in Europe, gives the ancient porcelain a value far above that of the modern. It must be owned, the ancient seems finer as to the matter, more perfect as to the baking, and of a more pleasant cast, both as to the white of the ground, and the other colours; yet it is certain, the most able and discerning may be deceived herein: and there are workmen who make it their business to counterfeit the ancient porcelain, called kutong in the modern.

The matter of these false kutong is a yellowish earth, found near Kingteching. There is nothing particular in the first part of the process, except that they are made thicker, and that they are varnished with an oil drawn from the yellow stone, mixed with the common oil, which gives them a kind of sea-green hue. When taken out of the oven, they throw it into a fatty broth, made of capons, &c. in which they boil it a second time; they then bury it in the filthiest sink they can find, for a month or six weeks, or more, according as they would give it the greater appearance of antiquity. Besides their thickness and their colour, these false antiques resemble the true ones in this, that they do not resound when struck, nor even give the least buz, when held to the ear. Notwithstanding the vast quantity of porcelains made in almost all the provinces of the empire of China, they still continue very dear; though not so dear as anciently. The Chinese annals tell us of times wherein a single urn cost 90 or an 100 crowns on the spot. What chiefly occasions the extraordinary price of this commodity, especially in Europe, is, beside the great profits of the merchants in Europe, and their factors in China, that it rarely happens an oven succeeds throughout; that it is frequently quite spoiled, so that, upon opening it, in lieu of fine porcelains, is found a hard unformed mass, into which both the porcelains and their coffins are converted, either by excess of heat, or some ill qualities in the matter.

Another reason of the dearness of porcelain is, that the ingredients it is made of, and the wood wherewith it is burnt, grow more and more scarce. One may add a third reason for the excessive price of porcelains to the Europeans; and it is this, that most of those sent to Europe are formed on new models, frequently very capricious, and difficult to succeed in; which, yet, for the smallest defects, are turned on the manufacturer's hands; and he, not being able to dispose of them to the Chinese, because not to their taste nor to their use, is forced to charge the porcelain he delivers, the higher, to pay himself for those refused.

The French have been for several years attempting to imitate porcelain. The first essays, made at Rouen, are said to have succeeded tolerably well; and M. Savary tells us, are now carried to such a point in the manufactories at Passi and St. Cloud, that the French porcelains want nothing to make them of equal value with the Chinese, but to be brought 5 or 6000 leagues. In effect, for the fitness of the grain of the matter, the beauty and turn of the vessels, the exactitude of the design, and the lustre of the colours, at least the blues, the French are

not much behind the Chineſe. But their grand defect is in the white of the ground, which is uſually dingy and dull, and eaſily diſtinguiſhes itſelf from the pure ſprightly white of the Chineſe.

But the Saxons ſeem to have exceeded the French. There is a manufacture at Meiſſen, the capital of Miſnia, which, the baron de Pollnitz aſſures us, produces porcelains painted and enamelled in ſuch perfection, that they are more beautiful, as well as dearer, than thoſe of China itſelf. The invention is owing to an alchymiſt, who, being clapped up in the caſtle of Konigſtein, by the late king of Poland, on a ſuſpicion of being maſter of the ſecret of the philoſopher's ſtone, had leiſure enough not indeed to make gold, but to invent a ware, which, by the great vent of it, conſiderably enriches the country.

Porcelain, alſo denotes a kind of little white ſea-ſhell found along with ſponges, and current in ſeveral parts of Aſia, Africa, and America, as coin. They are of ſome uſe in medicine, and are preſcribed pounded in the manner of pearls.

PORCH, *Atrium*, a kind of veſtible or entrance, generally ſupported by columns, and much uſed in ancient temples, churches, halls, &c.

In the ancient architecture it was a diſpoſition of inſulated columns, uſually crowned with a pediment forming a covert place before the principal door, as that before St. Paul's, Covent-Garden, the work of Inigo Jones.

When it had four columns in front, it was called tetraſtyle; when ſix, hexaſtyle, &c. Vitruvius calls it pronas; Pollux, prodomos: when finer than ordinary, the ancients called it propylæum.

PORE, in philoſophy, a little interſtice between the particles of matter which conſtitute bodies, either empty or filled, with ſome inſenſible medium. The moſt ſolid bodies have ſome kind of pores, otherwiſe all would be alike ſpecifically heavy. Sir Iſaac Newton has ſhewn that bodies are much more rare and porus than is commonly believed.

Pores, in anatomy, are certain ſpaces between the parts of the ſkin, whereby we ſweat or perſpire. See Cutis.

PORIME, *Porima*, in geometry, a theorem ſo eaſily demonſtrated, that it is almoſt ſelf-evident, as that a chord is wholly within a circle, &c.

PORISM, *Poriſma*, in mathematicks, a general theorem that ſerves to ſolve other general and difficult problems.

PORISTICK Method, in mathematicks, that method which determines when, by what methods, and how many different ways a problem may be ſolved.

PORPHYRY, *Porphyrites*, in natural hiſtory, &c. a kind of marble of a browniſh red colour, frequently interſperſed with white ſtains, anciently brought from Egypt, and exceeding all others in hardneſs.

PORRACEOUS, in medicine, is applied to the bile, fæces, &c. when their colour is green, approaching that of a leek.

PORT, *Portus*, *Haven*, or *Harbour*, a commodious place, for the moſt part at the mouth of a river, with depth of water ſufficient for ſhips of burden, and a convenient bottom for anchorage, where veſſels lie for loading or unloading, ſcreened from the wind and all enterprizes of an enemy, either by the natural ſituation of the place, or a mole, dike, &c. with a chain and lighthouſe. Ports are either natural or artificial.

Natural Ports, are thoſe formed by Providence ſeemingly for the convenience of commerce.

Artificial Ports, are thoſe formed by moles in the ſea.

Bar Ports, *Ports de Barre*, are ſuch ports as can only be entered with the tide, by reaſon of ſand or rock banks that lie in the way, as that of Goa, &c.

Cloſe Ports, are ſuch ports as are within the body of a city, as thoſe of Rhodes, Venice, Amſterdam, Rochelle, Bayoane, St. John de Luz, &c.

Free Port, in commerce, a port open for merchants of all nations to load and unload their veſſels in, without paying any duties, as Genoa, Leghorn, Marſeilles, &c.

Free Port, alſo denotes a total exemption which any ſet of merchants enjoy for goods imported into a ſtate, or thoſe of the growth of a country exported.

Port, alſo denotes the burden of a ſhip, which is commonly eſtimated in tons; and this means that the ſea-water which would be contained in the ſpace which the capacity of the veſſel poſſeſſes, when floating in the ſea, weighs ſo many tons, reckoned at the rate of 2000 pounds each.

Port, alſo denotes a ſtrong wine brought from Oporto, or Port-a-port, in Portugal.

Port *of the Voice*, in muſick, the faculty of making the ſhakes, paſſages, and diminutions, wherein the beauty of a ſong, or piece of muſick, conſiſts, and which the Italians call trilli, gruppi, ſtraſcini.

Port, among ſailors, denotes the larboard or left ſide of the ſhip. Hence, to port the helm, is putting it on the left ſide that the ſhip may go to the right or ſtarboard.

PORTA, *vena Porta*, in anatomy, a very conſiderable vein that brings the blood to the liver through the whole ſubſtance whereof it is diſſeminated.

PORTABLE, any thing that is eaſy of carriage.

PORTAIL, in architecture, the frontiſpiece of a church viewed on the ſide wherein the great door is: and it likewiſe denotes the great door of a palace, caſtle, &c.

PORTAL, in architecture, denotes a little ſquare corner of a room, cut off from the reſt by the wainſcot; frequent in the ancient buildings, but now diſuſed.

It alſo denotes Portella, a little gate, where there are two gates of a different bigneſs; as alſo a kind of arch of joiner's work before a door.

PORTATE, or *Croſs Portate*, in heraldry, is a croſs which does not ſtand upright, but lies athwart the eſcutcheon, in bend, as if carried on the ſhoulder.

PORT-CRAION, a caſe for a pencil, uſually four or five inches long, wherein a pencil ſlides up and down by means of a ſpring and button. Its outſide is filed in eight faces, whereon are drawn the ſector lines; its inſide is round, &c.

Port-*Cullice*, *Herſe*, *Sarraſm*, in fortification, is an aſſemblage of ſeveral large pieces of wood joined acroſs one another like a harrow, and each pointed with iron at the bottom. They formerly uſed to be hung over the gateway of a fortified place, ready to let down in caſe of a ſurprize, when the gates could not be ſhut.

Now-a-days the orgues anſwer the purpoſe better.

PORTE, denotes the Grand Signior's palace at Conſtantinople.

PORTER, in the circuit of juſtices, is an officer who carries a verge or white rod before the juſtice in eyre.

Port-*Glaive*, ſword-bearer, an order of knights in Poland, called by the Latins enſiferi.

Port-*Greve*, *Port-grave*, *Port-reve*, was anciently the principal magiſtrate in ports and maritime towns.

Port-*Holes*, in a ſhip, are the embraſures or holes in the ſides of a ſhip, through which the muzzles of the cannon are put. All ſhips of 80 guns and above have three rows of port-holes: and thoſe of 40 guns and above have two rows; and under 40 guns have but one. The port-holes are ſhut up in a ſtorm, to prevent the water's driving through them, and the caſements or ports are now generally faſtened by hinges a-top of the holes, which are haled up or let down by means of halyards.

PORTICO, in architecture, a kind of ground-gallery, or piazza encompaſſed with arches ſupported by columns, without any immediate relation to doors or gates, where people walk under covert. The roof is commonly vaulted, ſometimes flat. The ancients called it lacunar.

The moſt celebrated porticos of antiquity were thoſe of Solomon's temple; that of Athens, where the philoſophers held their diſputes and converſations; and that of Pompey at Rome. Among the modern porticos, the moſt celebrated is the piazza of St. Peter of the Vatican, and that of Covent-Garden, London, done by Inigo Jones.

PORTION, *Portio*, a part or diviſion of any thing.

PORTIONER, is where a parſonage is ſerved by two or more clergymen alternately, in which caſe the miniſters are called portioners, becauſe they have only their proportion of the tythes or profits of the living.

PORTLAND-Stone, is a dull whitiſh ſpecies of pſadurium, much uſed in buildings about London: it is compoſed of a coarſe grit, cemented together by an earthy ſpar; it will not ſtrike fire with ſteel, but makes a violent effervеſcence with aqua-fortis.

PORTMANTEAU, a cloak-bag of cloth, leather, &c. in which the cloak, linen, and other habiliments of travellers are diſpoſed and laid on the horſe's crupper.

PORTRAIT,

PORTRAIT, in painting, the repreſentation of a perſon, and eſpecially of a face done from the life.

PORUS, in general, denotes a pore. See PORE.

PORUS *Biliarius*, according to ſome, is the ſame with the hepatic duct; but others make a diſtinction between them, and obſerve, that the ductus hepaticus runs from the liver to the ductus choledocus; and that the branches of this, diſtributed through the whole liver, make what are called the pori biliarii.

POSE, in heraldry, denotes a lion, horſe, or other animal, ſtanding ſtill, with all his four feet on the ground.

POSITION or SITUATION, in phyſicks, an affection of place, which expreſſes the manner of any body's being therein.

POSITION, or *the Rule of falſe* POSITION, otherwiſe called *the Rule of* FALSHOOD, in arithmetick, is a rule ſo called, becauſe in calculating on ſeveral falſe numbers taken at random, as if they were the true ones, and from the differences found therein, the numbers ſought are determined. This rule is either ſingle or double.

Single poſition, is when there happens in the propoſition ſome partition of numbers into parts proportional, in which caſe the queſtion may be reſolved at one operation, by this rule. Imagine a number at pleaſure, and work therewith according to the tenor of the queſtion, as if it were the true number; and what proportion there is between the falſe concluſion and the falſe proportion, ſuch proportion the given number has to the number ſought.

Therefore, the number found by argumentation ſhall be the firſt term of the Rule of Three; the ſecond number ſuppoſed, the ſecond term; and the given number, the third. See RULE OF THREE.

Or the reſult is to be regulated by this proportion, viz. as the total ariſing from the error to the true total, ſo is the ſuppoſed part to the true one. Example: A, B, and C, deſigning to buy a quantity of lead, to the value of 140l. agree that B ſhall pay as much again as A, and C as much again as B; what then muſt each pay?

Now ſuppoſe A to pay 10l, then B muſt pay 20l. and C 40l. the total of which is 70l. but ſhould be 140l. therefore, if 70l. ſhould be 140l. what ſhould 10l. be?

Double poſition, is when there can be no partition in the numbers to make a proportion. In this caſe, therefore, you muſt make a ſuppoſition twice, proceeding therein according to the tenor of the queſtion. If neither of the ſuppoſed numbers ſolve the proportion, obſerve the errors, and whether they be greater or leſs than the ſuppoſition requires, and mark the errors accordingly with the ſigns + and —. See CHARACTER.

Then multiply contrarywiſe the one poſition by the other error, and if the errors be both too great, or both too little, ſubtract the one product from the other, and divide the difference of the products by the difference of the errors. If the errors be unlike, as the one + and the other —, add the products, and divide the ſum thereof by the ſum of the errors added together: for the proportion of the errors is the ſame with the proportion of the exceſſes or defects of the numbers ſuppoſed to be the numbers ſought: or the ſuppoſitions and their errors being placed as before, work by this proportion as a general rule, viz. as the difference of the errors, if alike (or their ſum, if unlike) to the difference of their ſuppoſitions, ſo either error to a fourth number, which accordingly added to or ſubtracted from the ſuppoſition againſt it, will anſwer the queſtion.

POSITION, in geometry, is a term ſometimes uſed in contradiſtinction to magnitude: thus, a line is ſaid to be given in poſition, poſitione data, when its ſituation, bearing, or direction, with regard to ſome other line, is given: on the contrary, a line is given in magnitude, when its length is given, but not its ſituation.

POSITION is alſo uſed for a theſis or propoſition maintained in the ſchools. See THESIS.

POSITIVE, a term of relation ſometimes oppoſed to negative: hence a poſitive quantity, in algebra, is a real or affirmative quantity, or a quantity greater than nothing; thus called, in oppoſition to a privative or negative quantity, which is leſs than nothing, and marked by this ſign —. Poſitive quantities are deſigned by this character + prefixed, or ſuppoſed to be prefixed to them.

POSITIVE, in muſick, denotes the little organ uſually placed behind or at the feet of an organiſt, played with the ſame wind and the ſame bellows, and conſiſting of the ſame number of pipes with the larger one, though thoſe much ſmaller, and in a certain proportion: this is properly the choir-organ.

POSSE COMITATUS, in law, ſignifies the power of the county, or the aid and aſſiſtance of all the knights, gentlemen, yeomen, labourers, ſervants, apprentices, &c. and all others within the county that are above the age of 15, except women, eccleſiaſtical perſons, and ſuch as are decrepit and infirm.

POSSESSION, in law, the holding or occupying of any thing, either de jure or de facto.

Poſſeſſion de jure, is the title a man has to enjoy a thing, though it be uſurped and in the actual poſſeſſion of another; or where lands are deſcended to a perſon, and he has not yet entered into them: and poſſeſſion de facto, or actual poſſeſſion, is where there is an actual or effectual enjoyment of a thing.

POSSESSIVE, in grammar, a term applied to pronouns which denote the enjoyment or poſſeſſion of any thing, either in particular or in common: as *meus*, mine, and *tuus*, thine; *noſter*, ours, and *veſter*, yours. See the article PRONOUN.

POSSIBILITY, *Poſſibilitas*, in law, is defined to be any thing that is altogether uncertain, or what may or may not be, and is taken to be either near or remote.

A near poſſibility, is where an eſtate is limited to one after another's deceaſe, whilſt a remote poſſibility is ſomething extraordinary, that is never likely to come to paſs.

POSSIBLE, *Poſſible*, is ſometimes oppoſed to real exiſtence, and underſtood of a thing which, though it does not actually exiſt, yet may exiſt; as a new ſtar, another world, &c. which are particularly ſaid to be phyſically poſſible. It is alſo oppoſed to impoſſible, in which ſenſe it is applicable to any thing that does not contradict itſelf, or involve contradictory predicates, whether it actually exiſt or not, as a man, fire, &c. theſe are alſo ſaid to be logically poſſible.

POST, a courier or letter-carrier, or one who frequently changes horſes, poſted or placed on the road, for quicker diſpatch.

Penny POST, a poſt eſtabliſhed for the benefit of London and the parts adjacent, whereby any letter or parcel, not exceeding 16 ounces, or 10 pounds value, may be ſpeedily conveyed to and from the towns and villages within 10 miles of London quite round, for one penny each packet or letter, &c.

It is managed by a comptroller, under whom are an accomptant, collector, ſix ſorters, ſeven ſub-ſorters, and above 100 meſſengers.

POST, in war, denotes any place fortified or not, where a body of men may make a ſtand, fortify themſelves, or remain in a condition to fight an enemy.

A ſpot of ground ſeized by a party to ſecure the front of an army, is called an advanced poſt.

The advanced guard, or the right of a line, &c. is called the poſt of honour, which is always given to the oldeſt regiment.

POSTS, in building, large pieces of timber placed upright. The corner-poſts in a houſe are called the principal poſts, and thoſe placed between the principal ones for ſtrengthening the body of the houſe, prick-poſts.

POSTS, in ſculpture, are ornaments formed after the manner of rolls or wreathings, ſo called, as they ſeem to run after one another. Some are plain, and others flouriſhed.

POST *Diem*, a fee, by way of penalty, laid on a ſheriff for neglecting to return a writ after the day aſſigned. And this is four-pence to the cuſtos brevium.

POST-*Diſſeiſn*, in law, a writ given by the ſtatute of Weſtminſter for him, who having recovered lands or tenements by præcipe quod reddat, upon default or reddition, is again diſſeiſed by the former diſſeiſor.

POSTEA, in law, a certificate or return of the proceedings by niſi prius into the court of Common-pleas, after a verdict, and there entered upon record.

POSTERIOR, denotes ſomething that comes after another, in oppoſition to prior and anterior.

POSTERIORITY, in law, a kind of relation in holdings oppoſite to priority.

POSTERN, in Fortification, is a ſmall gate, commonly made in the angle of the flank of a baſtion, that of the curtin, or near the orillon, deſcending into the ditch; whereby the garriſon can march in and out, unperceived

unperceived by the enemy, to relieve the works, make sallies, &c. It also, in general, denotes any private back-door.

POSTHUMOUS, a child born after the death of his father, or taken out of the body of a dead mother, from whence it is frequently applied to the works of an author not published till after his decease.

POSTIL, a name anciently given to a note in the margin of the Bible, and afterwards to one in any other book posterior to the text.

POSTING, among merchants, the putting an account forward from one book to another, particularly from the journal or waste-book to the ledger.

POSTPONING, the putting any thing behind another, with regard either to the order of time or place.

POSTSCRIPT, usually marked thus, P. S. an article added to a letter or memoir, containing something recollected after the subscription of the piece.

POST-PREDICAMENTS, in logick, are certain general properties arising from a comparison of predicaments with each other, or modes following the predicaments, and often belonging to many.

POST-TERM, *Post Terminum*, a fee taken by the custos brevium of the Common-pleas for the return of a writ, not only after the day, but after the term in which such writs are returnable; for which the custos has 20d.

POSTULATE, *Postulatum*, in mathematicks, a clear evident proposition, wherein it is affirmed or denied that something may or may not be done.

POSTULATION, *Postulatio*, in the canon law, the nomination of a person to a dignity in the church, to which, by the canons, he cannot be elected, as for want of age, the possession of a benefice incompatible therewith, &c. So that the chapter, &c. is obliged to proceed by postulation, that is, to beseech the person to whom the confirmation of the election belongs, to approve of it, though it be not canonical.

POSTURE, in painting, &c. the proper situation of a figure with regard to the eye, and the principal members thereof with regard to one another, whereby its action is expressed. A posture is either natural or artificial.

Natural POSTURE, is such as is adapted to the mechanism of the body, or such as the ordinary actions and occasions of life lead us to exhibit.

Artificial POSTURE, is that which some extraordinary occasions lead us to exhibit, as that of a balance or posture-master.

POTABLE, *Potabilis*, something that may be swallowed by way of drink.

POTASH, in the manufactures, &c. an impure fixed alkaline salt made by burning from vegetables. We have several kinds of it in use in the various manufactures, but what is best for medicinal purposes, and is now expected to be used in the shops, is the Russian kind, which is made in a different manner from any of the others, and has therefore peculiar properties which they must necessarily want. It will be seen by the several analyses of vegetables in this work that one of their principles is an acid, and that this acid is volatile, and is sent up in vapour in burning. It may seem odd to those who look upon potash to be a mere fixed alkaline salt, to observe that the want of an admixture of this acid renders it defective: yet nothing is more certain than that potash and pure fixed alkali differ; that pure fixed alkali will not answer the purposes of potash in many of the manufactures, and that no good potash can be made without an admixture of this acid. It is evident that this volatile principle must be lost in the calcination, nay, in the very reducing the wood to ashes; it is for this reason that all the potash in the world made only by burning and lixiviation wants it, and is therefore defective. The Swedish and Russian alone have it, and they are therefore, properly speaking, alone true and perfect potash, fit for the purposes of our manufactures of several kinds. These Swedish and Russian kinds are divested of their native acid in the first process of burning; but it is peculiar in the after management of the works that it is restored to them again from other wood: this will be evident in the process itself.

The German potash is a tolerably white salt, very pure, not very hard, of a very acrid taste, and growing damp if kept in a moist air.

The Spanish is somewhat less pure salt than the German, moderately hard, often of a bluish colour, and of a less acrid taste.

The Russian potash is the hardest and darkest-coloured of all. It is brought to us in large masses, almost as hard as stones, and yet, of all the kinds, is the soonest affected with a damp air, and runs into the thinnest fluid by means of it.

The German kind is what is commonly sold among us under the name of pearl ashes. The manner of making it is this: large quantities of the wood are burnt, and the ashes produced by them are boiled in water; the water, when it has thus taken up the fixed salt they abound with, is set by to settle till very clear, and is then evaporated to a dryness; and the salt we meet with under the name of pearl ashes is left behind.

They use all sorts of trees indiscriminately for this, except the resinous kinds, which yield little or no salt. This is a good alkali, and answers very well for several purposes. But where what is properly called potash is required, that is, where a salt sated with the volatile acid and oil of the wood is wanted, there it cannot do.

The use of potash, in the manufactures, is very great. The soap and glass trade consume a vast deal of it; and the bleachers, dyers, &c. much more. In medicine, the German kind, or pearl ashes, serve our chymists in the place of alkali salts, that would come dearer. The Russian kind serves to make the medicinal lees, soap, and the common caustick; and no other sort ought to be used for either of these purposes.

POTENT, *Potence*, in heraldry, a kind of cross, whose ends all terminate like the head of a crutch; it is called the Jerusalem cross. He beareth sable, a cross potent, by the name of Aleyn.

POTENTIA, *Power*, that whereby a thing is capable of acting, or being acted upon.

POTENTIAL, *Potentialis*, in the schools, is applied to distinguish a kind of qualities which are supposed to exist in the body in potentia only; whereby they are capable, in some measure, of impressing on us the ideas of such qualities, though not actually inherent therein: as potential heat, and potential cold.

POTENTIAL, in medicine, &c. Cauteries are either actual, as a piece of red-hot iron; or potential, as lime, &c.

POTENTIAL, in grammar, an epithet applied to one of the moods of verbs. The potential is the same in form with the subjunctive, and is, according to Ruddiman, implied in that mood, for which reason that grammarian rejects it; but others will have it differ from the subjunctive in this, that it always implies in it either *possum*, *volo*, or *debeo*. It is sometimes called the permissive mood, because it often implies a permission or concession to do a thing.

POTION, *Potio*, a liquid medicine, consisting of as much as can be drank at one draught. The writers on pharmacy distinguish potions into cathartick, cardiack, and alterative.

POTTERY, the manufacture of earthen-ware, or the art of making earthen vessels.

POTTLE, an English measure containing two quarts. See MEASURE.

POULTICE, or POULTIS, a form of medicine also called cataplasm. See CATAPLASM.

POULTRY, all kinds of domestick birds brought up in yards, as cocks, hens, capons, ducks, turkeys, &c.

POUNCE, gum sandarick pounded and sifted very fine, to rub on paper, in order to preserve it from sinking, and to make it fit to write upon.

POUNCE is also a little heap of charcoal dust, inclosed in a piece of muslin or some other open stuff, to be passed over holes pricked in a work, in order to mark the lines or designs thereof on paper, silk, &c. placed underneath; which are to be afterwards finished with a pen and ink, a needle, or the like. This kind of pounce is much used by embroiderers, to transfer their patterns upon stuffs; by lace-makers, and sometimes also by engravers.

POUND, *Libra*, a standard-weight, for the proportion and subdivisions of which, see WEIGHT.

POUND also denotes a money of account; so called, because the ancient pound of silver weighed a pound troy.

POUND, among lawyers, denotes a place of strength, in

in which to keep cattle that are diftrained, or put in for trefpafs, until they are replevied or redeemed.

POUNDAGE, a fubfidy of 12d. in the pound, granted to the crown on all goods and merchandizes exported or imported; and if by aliens, one penny more.

POURSUIVANT, or PURSUIVANT, in heraldry, the loweft order of officers at arms.

POWDER, *Pulvis*, in pharmacy, a dry medicine well broken, either in a mortar, by grinding, or by chymical operations.

POWDERINGS, among builders, certain devices, ferving to fill up vacant places in carved works.

POWER, *Potentia*, in phyfiology, the faculty of doing or fuffering any thing.

POWER, in mechanicks, denotes any force, whether of a man, a horfe, a fpring, the wind, water, &c. which being applied to a machine tends to produce motion. See MECHANICAL *Powers*.

POWERS, in arithmetick and algebra, are numbers or quantities arifing from the fquaring or multiplication of any number or quantity by itfelf and then that product by the root or firft number again; and this third product by the root again; and fo on ad infinitum; as 2, 4, 8, 16, 32, 64, 128, 256, &c. Where 2 is called the root, or firft power, 4 is its fquare or fecond power, 8 its cube or third power, 16 its biquadrate or fourth power, &c. And thefe powers in letters or fpecies are expreffed by repeating the root as often as the index of the power expreffes. Thus a is the root or firft power, aa the fquare or fecond power, aaa the cube, $aaaa$ the biquadrate or fourth power. And to avoid the tedioufnefs of repeating the root fo often, when the powers are high, we only put down the root with the index of the power over it, thus; a^9 is the ninth power of a; b^{16}, b^{94}, are the 16th and 94th powers of b.

POX, in medicine, a difeafe of which there are various kinds, as the fmall-pox, French-pox, chicken-pox, fwine-pox, &c. See CHICKEN-POX.

Small POX, *Variolæ*, is a contagious difeafe that appears on the cutis, which it covers with puftules that leave efcars behind them.

French POX, in phyfick, a contagious difeafe contracted from a poifonous humour, ufually in coition.

PRACTICE, in arithmetick, or *Rules of* PRACTICE, are certain compendious ways of working the rule of proportion, or golden-rule. See RULE *of Three*.

PRÆ, a Latin prepofition, literally fignifying, before, and ufed in many words in our language, to denote the relation of priority; though they are often written with the common e, inftead of the æ; as præceffion or preceffion, prædeceffor or predeceffor, &c.

PRATIQUE, or PRATICK, in commerce, a negotiation, or communication of commerce, which a merchant-veffel obtains in the port it arrives in, and the countries it difcovers: hence to obtain a pratique, is to obtain a liberty to frequent a port, to go afhore, to buy and fell &c.

Pratique is particularly ufed for a licence to traffick, granted to the mafter of a fhip in the ports of Italy upon a bill of health; that is, a certificate that the place whence he came is not annoyed with any infectious difeafe.

PRAYER, in theology, is an offering up of our defires to God for things lawful and needful, with an humble confidence to obtain them through the alone mediation of Chrift, to the praife of the mercy, truth, and power of God, Matt. vi. 6. John xvi. 23, 24, 26. Prayer is either private or publick; for ourfelves, or others; for the procuring of good things, or the removing or preventing things evil, whence arife the diverfe kinds of prayer mentioned, 1 Tim. ii. 1, 2. As God is the only object of prayer, Pfal. l. 15. and as we muft pray for others, as well as for ourfelves, Jam. 5. 16. fo we are to pray fervently, Col. iv. 12. fincerely, Pfal. xvii. 1. conftantly, Col. iv. 2. with faith, Jam. v. 15. and not without repentance, Pfal. lxvi. 18. Jer. xxxvi. 7. and by the help of the holy Spirit, Rom. viii. 26.

PREACHING, in theology, the promulgation of the word of God in publick; or the making a fermon or publick oration, on fome paffage in the facred fcriptures, the ordinary ordained means, accompanied by the Spirit, of converting finners unto God, Luke xvi. 31.

PREADAMITE, a denomination given to the inhabitants of the earth, who, according to fome people, lived before Adam.

PREAMBLE, in law, the beginning of an act of parliament, &c. which ferves to open the intent of the act, and the mifchiefs intended to be remedied by it.

PREBEND, the maintenance a prebendary receives out of the eftate of a cathedral or collegiate church. Prebends are diftinguifhed into fimple and dignitary; a fimple prebend has no more than the revenue for its fupport; but a prebend with dignitary, has always a jurifdiction annexed to it.

PREBENDARY, an ecclefiaftick who enjoys a prebend.

The difference between a prebendary and a canon is, that the former receives his prebend, in confideration of his officiating in the church; but the latter merely by his being received into the cathedral or college.

PRECEDENT, in law, a cafe which has been determined, and which ferves as a rule for all of the fame nature: thus the precedents of a court have the force of laws, and no court will reverfe a judgment contrary to many precedents.

PRECENTOR, a dignity in cathedrals, popularly called the chantor, or mafter of the choir.

PRECEPT, in law, a command in writing fent by a chief juftice, juftice of the peace, &c. for bringing a perfon, record, or other matter, before him.

PRECEPT is alfo ufed for the command or incitement by which one man ftirs up another to commit felony, theft, &c.

PRECESSION, *Præceffio*, in aftronomy, a term applied to a flow motion of the equinoctial points towards the weft; that is, in the language of aftronomers, in antecedentia, or contrary to the order of the figns. See the article SIGN.

By reafon of this preceffion of the equinoctial points, the fixed ftars feem to move towards the eaft, and thereby to have their longitude, which is always reckoned upon the ecliptick, from the vernal equinoctial point, encreafed: and hence the conftellations feem to have deferted the places allotted them by the ancient aftronomers; for inftance, the beginning of the fign Aries, which in Hipparchus's time was near the vernal equinoctial point, and gave name to that point of the ecliptick, is now removed near a whole fign, or 30° eaftward; fo that Aries is now where Taurus ufed to be, Taurus where Gemini ufed to be, &c. and thus all the conftellations of the zodiack have changed their ancient places; but to avoid confufion, aftronomers have thought fit to let the feveral portions of the ecliptick, where thefe conftellations were at firft obferved to be, retain their old names, fo that the vernal equinoctial point is ftill reckoned the firft degree of Aries. However, thefe portions of the ecliptick, where the conftellations were at firft, are called anaftra, to diftinguifh them from the places where they now are, which are termed ftellata.

PRECIPITANT, *Præcipitans*, in chymiftry, is applied to any liquor which, when poured on a folution feparates what is diffolved, and makes it precipitate, or fall to the bottom of the veffel.

PRECIPITATE, *Præcipitatus*, in chymiftry, a fubftance which having been diffolved, in a proper menftruum, is again feparated from its folvent, and thrown down to the bottom of the veffel, by pouring fome other liquor upon it.

PRECIPITATION, *Precipitatio*, a procefs in chymiftry, which is a kind of feparation, whereby the particles of a body diffolved and fufpended in any menftruus liquor, are detached therefrom, and fall down to the bottom of the veffel.

To account for the procefs of precipitation. A fluid menftruum may be made to fuftain a body fpecifically heavier than itfelf, either by making the refiftance arifing from the cohefion of the parts of the fluid equal to the excefs of fpecifick gravity of thofe bodies above that of the menftruum; or by the heavy bodies being joined to fome lighter one; fo that the two together only make one whole equal in weight to the fluid.

In the firft cafe we know the refiftance is ftill proportional to the furface of the corpufcles, fo that the furface being diminifhed, the refiftance is weakened: the proportion therefore of the tenacity of the menftruum to the gravity

gravity of the corpuſcles being thus deſtroyed, a precipitation muſt enſue.

PRECORDIA, *Præcordia*, in anatomy, the parts about the heart, as the diaphragm, pericardium, hypochondria, and even the heart with the lungs, ſpleen, &c. See COR.

PRECURSOR, *Præcurſor*, forerunner, in theology, one who goes before any other to notify his coming.

This title is peculiarly applied to St. John the Baptiſt.

PREDECESSOR, one who has preceded another in any office, &c.

PREDESTINARIAN, in theology, one who adheres to the doctrine of predeſtination.

PREDESTINATION, in theology, cannot be better explained than it is in the XVIIth article of our moſt excellent church.

"*Predeſtination* to life, is the everlaſting purpoſe of "God, whereby (before the foundations of the world "were laid) he hath conſtantly decreed by his counſel, "ſecret to us, to deliver from curſe and damnation, "thoſe whom he hath choſen in Chriſt out of mankind, "and to bring them by Chriſt to everlaſting ſalvation, "as veſſels made to honour. Wherefore they which "be endued with ſo excellent a benefit of God, be called "according to God's purpoſe, by his Spirit working in "due ſeaſon: they, through grace, obey the calling: "they be juſtified freely: they be made ſons of God by "adoption: they be made like the image of his only "begotton Son, Jeſus Chriſt: they walk religiouſly in "good works, and at length, by God's mercy, they "attain to everlaſting felicity.

"As the godly conſideration of *predeſtination* and our "election in Chriſt, is full of ſweet, pleaſant and unſpeakable comfort to godly perſons, and ſuch as feel "in themſelves the working of the Spirit of Chriſt, "mortifying the works of the fleſh, and their earthly "members, and drawing up their mind to high and "heavenly things, as well becauſe it doth greatly eſtabliſh and confirm their faith of eternal ſalvation, to be "enjoyed through Chriſt, as becauſe it doth fervently "kindle their love towards God: ſo, for curious and "carnal perſons, lacking the Spirit of Chriſt, to have "continually before their eyes the ſentence of God's "*predeſtination*, is a moſt dangerous downfal, whereby "the devil doth thruſt them, either into deſperation or "into wretchleſſneſs of moſt unclean living, no leſs perilous than deſperation.

"Furthermore, we muſt receive God's promiſes in "ſuch wiſe as they be generally ſet forth to us in holy "ſcripture: and in our doings, that will of God is to "be followed, which we have expreſly declared unto us "in the word of God."

This holy making, ſcriptural doctrine, is warmly oppoſed by the Jeſuits, Pelagians, Arminians, Remonſtrants, Phariſees, ſelf-righteous juſtifiers, &c. in ſhort, by all "perſons" that are in a ſtate of nature, not "endued with ſo excellent a benefit of God," but are yet "carnal, lacking the Spirit of Chriſt," by whom alone a work of regeneration and belief of the ſcriptures can be wrought in the heart. But it is as zealouſly maintained by all thoſe whom "God hath called" from darkneſs to light, "according to his purpoſe and grace by "his Spirit working in due ſeaſon;" and ſuch do not contend for it merely becauſe it is a glorious, heavenly truth of God's word, but, alſo, becauſe in believing, they *experience* the power of "grace to obey the" heavenly "calling—in being juſtified freely—in being made "the ſons of God by adoption—in being made like the "image of God's only begotton Son, Jeſus Chriſt—in "being enabled to walk religiouſly in good works, and "at length, by God's *mercy*, they attain everlaſting "felicity." Yea, all ſuch, like our venerable reformers, *experience* the "godly conſideration of predeſtination, "and our election in Chriſt, to be full of ſweet, pleaſant and unſpeakable comfort, and *feel* in themſelves "the working of the Spirit of Chriſt, mortifying the "works of the fleſh, and their earthly members, and "drawing up their minds to high and heavenly things, "and greatly eſtabliſhing and confirming their faith of "eternal ſalvation, to be enjoyed through Chriſt, kindling a fervent love" and unfeigned gratitude in their heart "towards God."

PREDESTINATION alſo denotes a concatenation of ſecond cauſes appointed by providence, in virtue whereof things are brought to paſs by a fatal neceſſity, maugre all oppoſition, and contrary to all appearances. The Turks are great predeſtinarians.

PREDETERMINATION, *Prædeterminatio*, *Premotion*, in philoſophy, &c. that concurrence of God which determines men in all their actions, both good and evil; but, according to divines, only as to the phyſical part thereof, but not as to the moral part.

PREDIAL TYTHES, *Decimæ prædiales*, are tythes paid of things which grow from the ground only, as corn, hay, fruit, &c.

PREDICABLE, *Prædicabilis*, in logick, a general quality which may be applied to ſeveral ſubjects; or a nature which may be predicated univocally of all things to which it is common. Thus animal is predicable of man and beaſt, &c.

PREDICAMENT, *Prædicamentum*, *Category*, *Categorema*, in logick, an order of ſubſtances ranged according to their natures. The properties of a predicament, ex parte vocis, or with regard to the word whereby the predicament is denoted, are, that it be one, ſimple, preciſe, and concinnous.

The conditions requiſite, ex parte rei, or the thing to be ranged in a predicament, are,

That it muſt be a poſitive being, in excluſion of nonentities, negations, impoſſibilities, &c. a being per ſe, to exclude accidental things, &c. and finite, to exclude God and other tranſcendentals: real, ſince its intention is for the more commodious diſpoſing of things in their places; and laſtly, whole, complete.

PREDICATE, *Prædicatum*, in logick, that part of a propoſition which affirms or denies ſomething of the ſubject: thus God made man; God is the ſubject, and made man the predicate.

It is a celebrated law in predicates, that nothing is eſteemed to be abſolutely affirmed of another, unleſs it be affirmed in ſuch a manner, as wants nothing either in the ſubject, predicate, or copula, to make it true.

This alſo is a noted property of a predicate, that it contains in ſome meaſure its own ſubject; thus metal contains gold, ſilver, copper, &c. of which it is predicated.

Every predicate is indeed an attribute; but every attribute is not a predicate; thus ſoul, learning, are attributed to man, but not predicated of him.

PREDICATING, in logick, the act of affirming or denying ſomething of a thing, as, man is not an angel; body is a ſubſtance, &c.

Things predicated of others are reducible, 1. To genera, as animal, of a man, &c. 2. Forms, as whiteneſs, of ſnow, &c. And, 3. Equals, of things of equal extent, as ſpecies, difference, property, &c.

PREDICTION, *Prædictio*, the foretelling of what is to come, either by divine revelation, art, or conjecture.

PREDOMINANT, *Prædominans*, that which prevails or has ſome ſuperiority over another thing.

PREEMPTION, *Præemptio*, a privilege anciently allowed the king's pourveyor to have the firſt buying of corn, &c. for the king's houſhold, but taken away by ſtat. 19. Car. II.

PREENING, in natural hiſtory, the action of birds, dreſſing their feathers, to enable them to glide the more readily through the air, &c.

PRE-EXISTENCE, *Præ-exiſtentia*, the ſtate of a thing actually in being before another.

PREFACE, *Præfatio*, ſomething introductory to a book, to inform the reader of the deſign, method, &c. obſerved therein; and generally whatever is neceſſary to facilitate the underſtanding of a book.

PREFECT, *Præfectus*, in ancient Rome, one of the chief magiſtrates, who governed in the abſence of the kings, conſuls, and emperors.

PREGNANCY, *Graviditas*, the ſtate of a woman who has conceived, or is with child. See the article GENERATION, CONCEPTION, &c.

PREJUDICE, *Præjudicium*, does not mean a judgment merely as prior to another in reſpect of time, but as being paſſed before the things were duly conſidered and fully underſtood. Hence prejudice is ſometimes called anticipation, and a preconceived opinion; and makes one of the many cauſes of error. See ERROR.

PRELATE, an eccleſiaſtick raiſed to ſome eminent and

and superior dignity in the church; as bishops, archbishops, patriarchs, &c. See Bishop, &c.

PRELIMINARY, in general, denotes something to be examined and determined, before an affair can be treated of to the purpose.

PRELUDE, *Præludium*, in musick, is usually a flourish or irregular air, which a musician plays off-hand, to try if his instrument be in tune, and so lead him into the piece to be played. Very often the whole band in the orchestra run a few divisions, to give the tune.

PREMISES, or Premisses, *Præmissæ*, in logick, an appellation given to the two first propositions of a syllogism, as going before, or preceding the conclusion.

Premises, in law, properly signifies the land, &c. mentioned in the beginning of a deed. See Deed.

PREMIUM, or Præmium, properly signifies a reward or recompence; but is chiefly used in a mercantile sense for the sum of money given to an insurer, whether of ships, houses, lives, &c.

PREMONSTRATENSES, in church-history, a religious order, instituted by St. Norbert about the year 1119.

PREMUNIRE, or Præmunire, in law, is taken two ways; either for a writ, or for the offence for which it is granted.

Formerly the church of Rome carried its pretended right of supremacy to such a height, that several statutes were made to check and restrain the growing power of the pope; but more especially stat. 16. Richard II. c. 5. commonly known by the name of the statute of premunire, which ordains the punishment of offenders on this statue to be this; that they should be out of the king's protection, attached by their bodies, i. e. imprisoned at the king's pleasure, and lose their lands, goods, and chattels.

PRENOMEN, *Prænomen*, among the ancient Romans, a name prefixed to their family-name, answering to our christian name: such are Caius, Lucius, Marcus.

PREPARATION, *Præparatio*, in mathematicks, something preparatory to the demonstration of a proposition. Thus if a proposition in geometry is to be demonstrated, the preparation consists in drawing certain lines; and if a proposition in arithmetick, in some computation to be previously made to come at the demonstration.

Preparation, in pharmacy, &c. the manner of preparing and managing any medicine, in order to fit it to serve the purposes for which it is intended.

Preparation, in anatomy, the art of preserving the parts of animals for anatomical uses; which is done either by drying them thoroughly, or putting them in a proper liquor.

PREPENSED, or Prepense, *Præpensus*, in law, denotes fore-thought: thus, when a man is slain upon a sudden quarrel, if there was malice prepensed formerly between them, it makes it murder.

PREPOSITION, *Præpositio*, in grammar, one of the parts of speech, being an indeclinable particle which yet serves to govern the nouns that follow it.

PREPUCE, *Præputium*, in anatomy, the fore-skin; being a prolongation of the cutis of the penis, covering the glands.

PREROGATIVE, *Prærogativa*, a pre-eminence which one person has over another.

PRESAGE, *Præsagium*, in antiquity, denotes an augury, or sign of some future event; which was chiefly taken from the flight of birds, the entrails of victims, &c.

Among physicians, the term presage is sometimes used for prognostick sign.

PRESBYTA, in opticks, a person whose eyes being flat, can see distant objects distinctly, but those near, confusedly; which defect of sight got this appellation, because old people are naturally subject to it.

Spectacles, or convex-glasses, are the only remedy for this defect; for if these are well fitted to the degree of flatness of the eyes, they cause the rays of light to converge in such a manner from near objects, as to make them fall exactly on the retina, and thereby produce distinct vision.

PRESBYTER, in the primitive Christian church, an elder, one of the second order of ecclesiasticks; the other two being bishops and deacons. Presbyter, or elder, is a word borrowed from the Greek translation of the Old Testament, where it commonly signifies ruler or governor; it being a note of office and dignity, not of age; and in this sense, bishops are sometimes called presbyters in the New Testament.

PRESBYTERIANS, a sect of protestants, so called from their maintaining that the government of the church, appointed in the New Testament, was by presbyteries; that is, by ministers and ruling elders, associated for its government and discipline. The presbyterians affirm, that there is no order in the church, as established by Christ and his apostles, superior to that of presbyters; that all ministers being ambassadors of Christ, are equal by their commission; and that elder or presbyter, and bishop, are the same in name and office.

PRESCIENCE, in theology, fore-knowledge, or the knowledge which God has of events before they come to pass.

PRESCRIPTION, in law, is a right or title acquired by use and time, introduced for assuring the property of effects, in favour of persons who have for a certain time had them in their possession.

Prescription, in medicine, is the assigning a proper and adequate remedy to a disease, from an examination of its symptoms, and an acquaintance with the virtues and effects of the materia medica.

PRESENT, *Præsens*, in grammar, the first tense of a verb, expressing the present time, or that something is now performing; as, scribo, I write, or am writing. See Tense.

PRESENTATION, in law, the act of a patron offering his clerk to be instituted in a benefice of his gift, the same being void.

PRESENTEE, the clerk presented to a benefice by the patron.

PRESENTMENT, in law, a denunciation of jurors, or a justice of the peace, or other officers, without any information of an offence inquirable by the court to which it is presented; or it may be said to be an information made by the jury in a court before a judge, who has authority to punish any offence committed contrary to law; and it is what the grand jury finds and presents to the court, without any bill of indictment delivered: yet it is afterwards reduced into the form of an indictment.

PRESEPE, or Præsepe, in astronomy, the name given to three nebulous stars in the breast of Cancer.

PRESERVATION, in general, denotes the art of preserving things in a state of perfection; or, at least, from being so far corrupted and spoiled, as to be no longer useful. Fruits may be long preserved in spirit of wine, first well saturated with the skins and tinging parts of those fruits; and many may be tolerably preserved in perfectly fermented liquors, which generate no more air. The more solid vegetable substances may be preserved by gently drying in the sun, shade, or other slack heat. Thus peas or beans may be dried young in a slack oven, in their proper season, and may afterwards be boiled in the winter, and will eat young and tender, as if just gathered.

PRESERVATIVE, among physicians, denotes a medicine taken by way of precaution; or, to secure a man from a disease that threatens him.

The principal preservatives, according to Boerhaave, are abstinence, quiet, drinking warm water; and, after this, a gentle and continued motion till the first appearance of sweat; then a profound sleep, the body being well covered.

In the time of a plague, preservatives are very necessary against the contagion of the air.

Generous wines, cardiacks, and sudorificks, are also powerful preservatives.

PRESIDENT, *Præses*, an officer created or elected to preside over a company, in contradistinction to the other members, who are called residents.

PRESS, *Prelum*, in the mechanick arts, a machine of wood, or iron, serving to squeeze any body very close.

Presses consist of six pieces; two flat smooth planks, between which the things to be pressed are laid; two screws or worms fastened to the lower plank, and passing through two holes in the upper; and two nuts in form of an S, that serve to drive the upper plank, which is moveable, against the lower which is fixed.

Presses *used for expressing Liquors*, are generally the same

ſame with the common preſſes, only the under plank is perforated with a great number of holes for the juice to run through. Others have only one ſcrew or arbour, paſſing through the middle of the moveable plank, which deſcends into a kind of ſquare box, full of holes, through which the juices flow, as the arbour is turned.

Press *uſed by Joiners*, to keep cloſe the panels, &c. of wainſcot; it conſiſts of two ſcrews, and two pieces of wood four or five inches ſquare, and two or three feet long, whereof the holes at the two ends ſerve for nuts to the ſcrews.

Press *uſed by Inlayers*, reſembles the joiners preſs, only the pieces of wood are thicker, and only one of them moveable; the other, which is in form of a treſſel, being ſuſtained by two legs joined into it at each end.

This ſerves for ſawing and cleaving the pieces of wood required in marquetry.

Founders Press, is a ſtrong ſquare frame, conſiſting of four pieces of wood firmly joined together with tenons, &c. It is of various ſizes: two of them are required to each mould, at the two extremes whereof they are placed; ſo as that, by driving wooden wedges between the mould and ſides of the preſs, the two parts of the mould for the metal may be preſſed cloſe together.

Printing Press. See Printing *Preſs*.

Rolling Press, a machine uſed for the taking off prints for copper-plates. See *Rolling Preſs* Printing.

Press, in coining, a machine uſed in ſtriking of money, having only one iron bar to give it motion, and preſs the moulds or coins. See Coining.

Binders Press, or *cutting Preſs*, a machine uſed by book-binders, ſtationers, and paſteboard-makers, conſiſting of two large wooden cheeks joined by two ſtrong wooden ſcrews; which, being turned by an iron bar, draw together or ſet aſunder the cheeks at pleaſure.

The cheeks are placed flat on a wooden ſtand, in form of a cheſt, into which the cuttings fall. Aſide of the cheeks are two pieces of wood of the ſame length with the ſcrews, ſerving to direct the cheeks. Upon the cheeks is the ſhaft or fuſt, to which the cutting-knife is faſtened by a ſcrew which has its key to diſmount it on occaſion.

The ſhaft conſiſts of ſeveral parts; a wooden ſcrew, which, catching within the nut of the two feet that ſuſtain it, brings the knife to the paper which is pretty long, has two directories, which reſemble thoſe of the ſcrew of the cheeks. To make the ſhaft ſlide ſquare, that foot of the ſhaft where the knife is not fixed, has a kind of groove directed by a thread faſtened along one of the cheeks. Laſtly, the knife is a piece of ſteel five or ſix inches long, pointed a-top, and ſquare all the reſt.

Press, in the woollen manufactory, a large wooden machine that ſerves to preſs cloths, ſerges, &c. to render them ſmooth, and give them a gloſs. The principal parts of the machine are the cheeks, the nut, and the ſcrew, accompanied with its bar to turn it round, and make it fall on a thick wooden plank, under which the ſtuffs are placed. Another kind of preſs for linens, ſilks, &c. is called a calender.

PRESSING, in the manufactures, the action of violently ſqueezing a cloth, ſtuff, &c. to render it ſmooth and gloſſy. This, in the linen and ſilken manufactures, is properly called calendering. There are two manners of preſſing; the one cold and the other hot.

Method of Pressing *cold*. After the ſtuff has been ſcoured, fulled, and ſhorn, it is folded ſquare in equal plaits, and a ſkin of vellum, or paſteboard, put between each plait. Over the whole is laid a ſquare wooden plank, and ſo put into the preſs, which is ſcrewed down tight by means of a lever. After it has lain a ſufficient time in the preſs, they take it out, removing the paſteboards, and lay it up to keep. Some only lay the ſtuff on a firm table, after plaiting and paſteboarding, cover the whole with a wooden plank, and load it with a proper weight.

Method of Pressing *hot*. When the ſtuff has received the above preparations, it is ſprinkled a little with water, ſometimes gum-water, then plaited equally, and between each two plaits are put leaves of paſteboard; and between every ſixth or ſeventh plait, as well as over the whole, an iron or braſs plate well heated in a kind of furnace. This done, it is laid upon the preſs, and forcibly ſcrewed down.

Under this preſs are laid five, ſix, &c. pieces at the ſame time, all furniſhed with their paſteboards and iron plates. When the plates are well cold, the ſtuffs are taken out and ſtitched a little together to keep them in the plaits. This manner of preſſing was only invented to cover the defects of the ſtuffs; and, accordingly, it has been frequently prohibited.

PRESSION, *Preſſure*, in the Carteſian philoſophy, an endeavour to move impreſſed on a fluid medium, and propagated through it. In ſuch a preſſion, the Carteſians ſuppoſe the action of light to conſiſt.

But Sir Iſaac Newton has taught us better: for if light conſiſted only in a preſſion, without actual motion, it could not warm ſuch bodies as reflect and refract it; and if it conſiſted in an inſtantaneous motion, as ſuch preſſion ſuppoſes, there would be required an infinite force to produce that motion every moment in every lucid particle: hence it muſt follow, that light would inflect itſelf ad umbram; for preſſion, in a fluid medium, cannot be propagated in right-lines beyond any obſtacle which ſhall hinder any part of the motion; but will inflect and diffuſe itſelf every way into thoſe parts of the quieſcent medium, which lie beyond the ſaid obſtacle. See his *Opticks*.

Pressure *of the Air*. See Air.

PREST, a duty in money paid by the ſheriff upon his account in the Exchequer, for money remaining in his hands.

Prest-*Money*, a ſum of money given to thoſe enliſted, whereby they are bound to be ready to march at command.

PRESTATION-Money, a ſum of money paid yearly by archdeacons, and other dignitaries, to their biſhop, pro exteriori juriſdictione.

PRESTER, a meteor conſiſting of an exhalation thrown from the clouds downwards with ſuch violence, as that by the colliſion it is ſet on fire.

PRETERITE, in grammar, ſignifies the tenſe uſed to expreſs the time paſt, or an action completely finiſhed: as ſcripſi, I have written.

PRETERITION, in rhetorick, a figure whereby, in pretending to paſs by a thing untouched, we take a ſummary view of it.

PRETEXT, a colour or motive, whether real or feigned, for doing ſomething.

PRETOR, or Prætor, a magiſtrate among the ancient Romans, not unlike our lord chief juſtices, or lord-chancellor, or both in one; as being veſted with the power of diſtributing juſtice among the citizens.

PRETORIAN Guards, *Prætoriæ Cohortes*, in Roman antiquity, were the emperor's guards, who at length were encreaſed to 10,000; according to ſome, they had this denomination from their being ſtationed at a place in the palace called prætorium; their commander was ſtiled præfectus prætorii.

PREVARICATION, *Prævaricatio*, in the civil law, is where the informer colludes with the defendants, and ſo makes only a ſham proſecution.

Prevarication, in our laws, is when a man falſely ſeems to undertake a thing, with intention that he may deſtroy it; where a lawyer pleads booty, or acts by colluſion, &c.

PREVARICATOR, *Prævaricator*, at Cambridge, is a maſter of arts, choſen at a commencement, to make an ingenious ſatirical ſpeech, reflecting on the miſdemeanours of the principal members.

PREVENTION, *Præventio*, in the canon-law, &c. the right which a ſuperior perſon has to claim or tranſact an affair, prior to an inferior one.

PRIAPISM, in medicine, a continual and painful erection of the penis.

PRIAPUS, in medicine, the genital parts in men.

It alſo denotes, in antiquity, a fabulous deity, revered very much for the extraordinary ſize of his parts.

PRICKING, in the ſea language, is to make a point on the plat or chart, near about where the ſhip then is, or is to be at ſuch a time, in order to find the courſe they are to ſteer.

PRIEST, *Sacerdos*, a perſon ſet apart for the performance of ſacrifice, and other offices of religion.

Priest, *Preſbyter*, in the Chriſtian church, is a perſon inveſted with holy orders; in virtue whereof he has a power to preach, pray, adminiſter the ſacrament, &c. Alſo, in the Romiſh church, to bleſs, abſolve, &c.

PRIMÆ VIÆ, among phyficians, denotes the whole alimentary duct, including the oefophagus, ftomach and inteftines, with their appendages.

PRIMAGE, in commerce, a fmall duty at the water-fide, ufually about twelve-pence per tun, or fix-pence a bale, due to the mafter and mariners of a fhip; to the mafter for the ufe of ropes, &c. to difcharge the goods; and to the mariners, for the loading or unloading of the veffel.

PRIMARY PLANET, in aftronomy, one that revolves round the fun as a centre.

PRIMATE, *Primas*, in church-polity, an arch-bifhop, who is invefted with a jurifdiction over other bifhops.

PRIME, *Primus*, an appellation given to whatever is firft in order, degree, or dignity, among feveral things of the fame or like kind; thus we fay, the prime minifter, prime coft, &c.

PRIME *Figure*, in geometry, one which cannot be divided into any other figures more fimple than itfelf, as a triangle among planes, and the pyramid among folids.

PRIME *of the Moon*, is the new moon, when fhe firft appears, which is about three days after the change. See MOON.

PRIME *Vertical*, is that vertical circle which paffes through the poles of the meridian, or the eaft and weft points of the horizon; whence dials projected on the plane of this circle, are called prime vertical, or north and fouth dials.

PRIME, in the Romifh church, is the firft of the canonical hours, fucceeding to lauds.

PRIME, in fencing, is the firft chief of the guards.

PRIMING, or PRIME *of a Gun*, is the gunpowder put into the pan or touch-hole of a piece, to give it fire thereby; and this is the laft thing done in charging.

PRIMING, among painters, fignifies the laying on of the firft colours.

PRIMITIVE, in grammar, is a root or original word in a language, in contradiftinction to derivative: thus *God*, is a primitive; *godly*, derivative; and *god-like*, a compound.

PRIMOGENITURE, *Primogenitura*, the right of firft-born.

PRIMULA, the primrofe, in botany, a genus of plants, whofe flower is monopetalous; the tube is cylindraceous; the length of the cup and the limb is expanded, and divided into five cordated fegments: the ftamina are five fhort filaments, placed in the neck of the corolla, and terminated by erect accuminated antheræ: the fruit is an oblong capfule, opening at the top, and filled with roundifh feeds. This genus includes the auricula of Tournefort, and the polyanthus of the gardeners.

PRIMUM MOBILE, in the Ptolemaick fyftem of aftronomy, the firft mover.

PRINCE, *Princeps*, in polity, a perfon invefted with the fupreme command of a ftate, independent of any fuperior.

PRINCE, alfo denotes a perfon who is a fovereign in his own territories, yet holds of fome other as his fuperior.

PRINCE *of the Senate*, in old Rome, the perfon who was called over firft in the roll of fenators, whenever it was renewed by the cenfors: he was always of confular and cenforian dignity. See SENATE.

PRINCE'*s Feather*, in botany, the fame with Amaranth. See AMARANTHUS.

PRINCIPAL, *Principalis*, the chief and moft neceffary part of a thing.

In commerce, principal is the capital of a fum due or lent, fo called in oppofition to intereft.

It alfo denotes the firft fund put by partners into a common ftock, by which it is diftinguifhed from the calls or acceffions afterwards acquired.

PRINCIPAL *Point*, in perfpective, is a point in the perfpective plane, upon which a line drawn from the eye perpendicular to the plane falls. It is in the interfection of the horizontal and vertical plane, and called the point of fight and point of the eye.

PRINCIPAL *Ray*, in perfpective, that which paffes perpendicularly from the fpectator's eye to the perfpective plane.

PRINCIPLE, *Principium*, in general, is ufed for the caufe, fource, or origin of any thing.

PRINCIPLES, in phyficks, are often confounded with elements, or the firft and fimpleft parts whereof natural bodies are compounded, and into which they are again refolvible by the force of fire.

PRINTER, *Typographus*, a perfon who compofes, or takes impreffions from moveable characters, which are ranged in order, or from plates engraved, by means of ink and a prefs. See PRINTING.

The printers, fince the eftablifhment of that art, make now confiderable part of the company of ftationers and bookfellers: before that time, the company confifted only of bookfellers, book-binders, writers, illuminers, and parchment-makers.

PRINTING, *Typographia*, the art of taking off impreffions with ink from characters either moveable or immoveable, upon paper, vellum, &c.

There are two kinds of printing, the one for books, the other from copper-plates. The firft is called common-prefs printing, the characters in which are caft in relievo; the fecond, rolling-prefs printing, which is engraved in creux.

The genius of the Germans has appeared in the invention or improvement of feveral mechanical arts, and, amongft others, they lay claim to the honour of having invented the curious and ufeful art of printing. This art is faid to be of a very ancient ftanding in China, but then their manner is quite different from that which obtains in Europe; though it muft be owned, the European printing, in its infancy, was much the fame with the Chinefe: however, as there was then no correfpondence between Europe and China, the paffage into the Eaft by the Cape of Good-Hope being undifcovered, there is no reafon to charge the Europeans with having borrowed their art from the Chinefe, but each may be allowed to have fallen upon the fame invention, though at very different times.

Printing, according to Father Le Comte, has been known in China from almoft all ages; but the great difference between theirs and ours is this, that whereas we have but a fmall number of letters in our alphabets, by the various arrangement whereof we can form infinite volumes, fo, by making our characters moveable, we are able to print the largeft works with an inconfiderable quantity of letter, the fame which ferved for the firft fheets, ferving alfo for the fucceeding ones, by being feparated and placed in different order. The Chinefe, on the contrary, by reafon of their great number of letters, find it more eafy, and lefs expenfive, to cut them on wooden blocks, making as many blocks as there are pages in the book they intend to print, and thefe are of no farther ufe but for that fingle work.

The art of joining letters to form words, and of combining the one and the other in an infinite number of different ways, is a fecret unknown to the Chinefe. At firft, like the Egyptians, they ufed hieroglyphicks, and painted, rather than wrote, ftriving by the natural images of things, as a bird, a tree, &c. to exprefs and communicate their ideas to one another. But this manner of writing was not only very incommodious, but imperfect, as they could but exprefs their thoughts by halves, and what they did exprefs was frequently liable to be mifunderftood, not to mention the room thefe pictures took up, which obliged them to write a great deal to fay very little. To remedy thefe inconveniencies, they changed their way of writing by degrees, and even invented feveral characters to exprefs things that did not come within the reach of painting to reprefent, as the paffions, thoughts, voice, tafte, and a thoufand other objects, without body or figure. From fimple ftrokes, they framed others more compound, and contriving one or more characters for every word, they multiplied their letters almoft to infinity. This feems to be the fource of that ignorance we find among the Chinefe. So great a part of their lives being fpent in learning their letters, that they have not time to apply themfelves to the ftudy of things, but think themfelves learned, if they are able to read. Nay, we are told, fcarce any of them know all their letters; and Father Le Comte is of opinion, the greateft doctor amongft them never underftood half their letters perfectly, for he reckons the whole number to be 80,000. This is a great inconvenience to foreigners, and much complained of by the miffionaries in that country.

Who was the firft inventor of printing in Europe, and in what city and year it was firft fet on foot, is a queftion long difputed among the learned, and not yet thoroughly decided.

The cities of Mentz and Strafbourg, and that of Haerlem

The New Complete Dictionary of Arts & Sciences. By The Revd. Mr. Middleton & others.

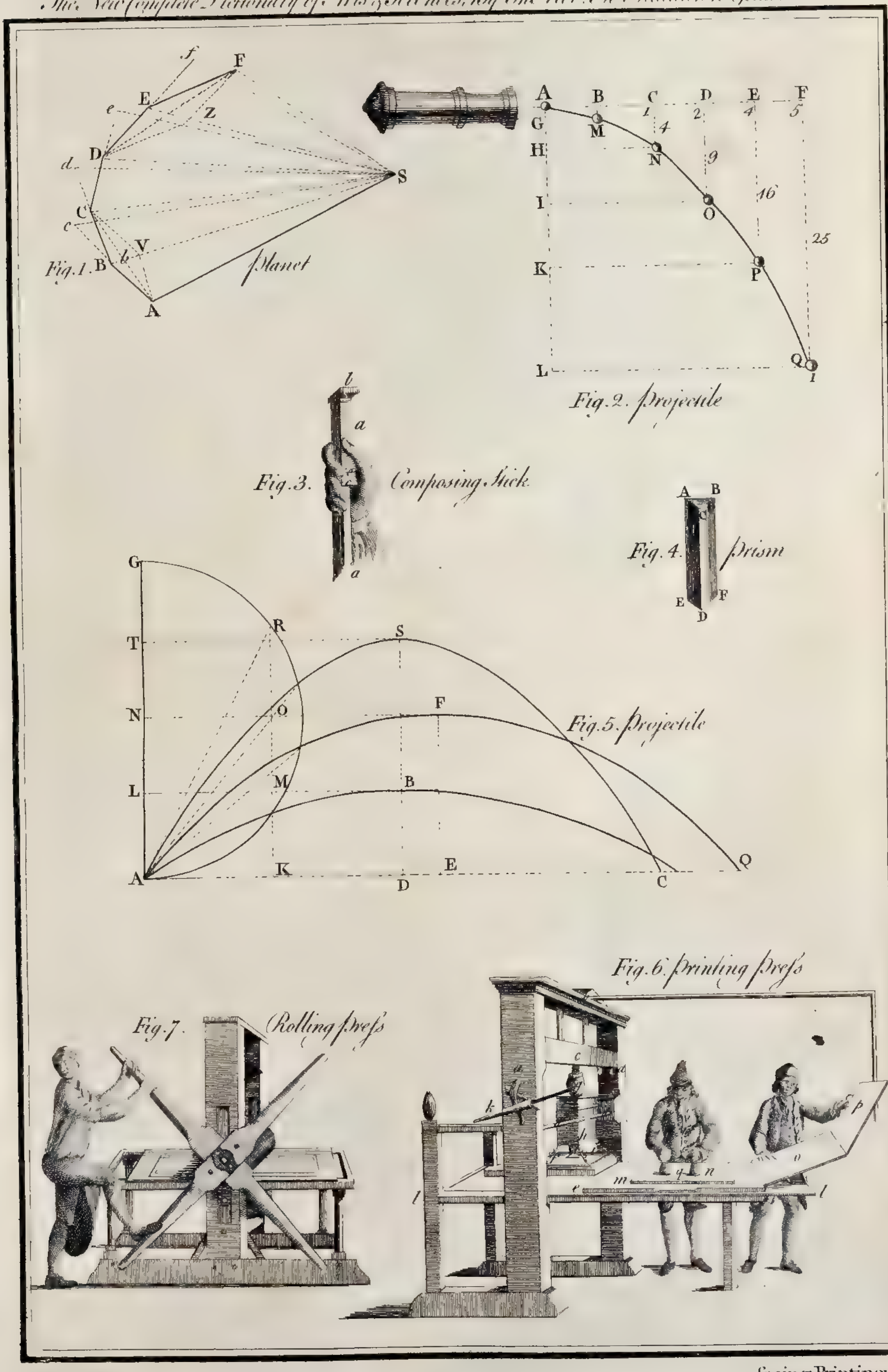


Plate LXVI

facing Printing

Haerlem in Holland, are the warmeſt on this point of honour, but Mentz has always had the majority of voices. We ſhall here, for the ſatisfaction of the reader, propoſe the pretenſions of each, without entering into a nice diſquiſition of the merits of the cauſe. John Mantel of Straſbourg, John Guttemberg and John Fuſt of Mentz, and Laurence John Koſter of Haerlem, are the perſons to whom this invention has been moſt frequently aſcribed, but the firſt ſeems to have had the feweſt advocates. Mantel, however, a French phyſician, enters the liſts in behalf of his nameſake, and contends that he firſt invented printing in the year 1442, in conſideration whereof the emperor Frederick III. gave him a ſuitable coat of arms; and he adds, that Guttemberg, whom he had made his aſſociate, carried the art to Mentz, where he took in firſt a partner. Boxhornius, Schrevelius, and other authors, refer the invention to Koſter of Haerlem, in the year 1430, adding, that Fuſt ſtole away Koſter's materials, and ſet up printing at Mentz, aſſiſted by his ſervant, Peter Schœffer, who afterwards married his daughter, and became his partner in the buſineſs; but others aſcribe this theft to Guttemberg. Polydore, Virgil, Paſquier, &c. will have Guttemberg to be the inventor of printing, but Naude eſpouſes the cauſe of Fuſt, whom he makes the firſt printer in Europe. His reaſon for aſcribing the invention to Fuſt is, that his name appears in the moſt early printed books, as in the Latin bible of 1462, Tully's offices of 1465, and perhaps ſome of a prior date; and, if Guttemberg, or Koſter, had a greater or an equal ſhare in the invention, it is more than probable they would not have allowed him to attribute the whole to himſelf, and his ſon-in-law, Schœffer, as he has done, without contradicting him, and aſſerting their own right. He adds, that whatever is urged in behalf of Guttemberg, Mantel, or Koſter, is only founded on reports, conjectures, and forged authorities.

But the diſpute is not thus terminated: the advocates for Koſter make uſe of various arguments in his favour. Mr. Ellis (in the Philoſophical Tranſactions) gives an account of books printed by Koſter of an earlier date than any of thoſe referred to Fuſt, and ſome even as early as 1430 and 1432. At Haerlem, it is certain they ſhew printed books of that date, which ſeem to Mr. Ellis to put it out of doubt, that the honour of the invention belongs to Koſter, and that Fuſt only eſtabliſhed the art in greater perfection at another place many years after. Beſides, it is allowed on all hands, that the De Spiegil Onſer Behoedinge (or mirrour of our ſalvation) which is ſhewn at Haerlem, for the firſt printed book could never be Koſter's firſt eſſay. He muſt have made many trials on ſmaller works, and undoubtedly his firſt attempts were on looſe and ſmall leaves, which we may ſuppoſe were eaſily loſt. Upon the whole, it is no inconſiderable argument in Koſter's behalf, that the rudeſt and moſt artleſs performances in printing ſeem to be his; of which kind ſome things without date are to be ſeen in the king's library at St. James's, and in the Bodleian at Oxford. They have the marks of the utmoſt ſimplicity, and may reaſonably be taken for firſt eſſays, being aukward and coarſe, and the ink only common writing ink, which was unartfully ſpread upon wooden blocks, cut in a very clumſy manner.

Whoever, therefore, were the firſt printers, or whenſoever the hint was taken, ſuch was the art in its original ſtate, ſeveral pieces in the Bodleian library, and that of Bennet's college, being printed in this way; and the impreſſion ſeems to have been made only on one ſide of the leaves, after which the two blank ſides were paſted together. But this method of printing upon wooden cuts being found inconvenient, it was not long before an improvement was thought of, viz. the making of ſingle moveable letters, which was firſt done in wood, and afterwards in metal; from which laſt invention we ought to date the origin of the preſent art of printing, as practiſed through Europe. This ingenious contrivance of caſting ſingle types in metal is generally aſcribed to the above-mentioned Schœffer, firſt ſervant, afterwards partner and ſon-in-law of Fuſt at Mentz in Germany; ſo that he was properly the firſt printer, as well as letter-founder; and, ſtrictly ſpeaking, the Bible printed with moveable types in 1450, or thereabouts, was the firſt printed book, which ſoon was followed by editions of Auguſtin de Civitate Dei, the vocabulary called Catholicon, Tully's Offices, and ſeveral other works. It is ſaid that Fuſt (or Fauſtus, as ſome authors call him) carried a parcel of his printed bibles to Paris, and offered them to ſale as manuſcripts; but the French, conſidering the number of the books, and their exact conformity to each other, even to a point, and that the beſt book-writers could not come up to ſuch exactneſs, concluded there was witchcraft in the caſe, and by indicting him as a magician, or threatening to do ſo, obliged him to diſcover the ſecret. Hence, the origin of that popular ſtory of Dr. Fauſtus.

From Mentz the art of printing ſpread itſelf in a ſhort time through a great part of Europe, and is commonly ſaid to have been brought into England from Haerlem in 1468, by William Caxton, a merchant and citizen of London, who having been abroad in the Low Countries for many years, not only got an inſight into the buſineſs, but prevailed with Frederick Corſeilles, one of the workmen, to come over and ſet up a preſs at Oxford, where an edition of Ruffinus on the Creed was printed in the ſame year. In 1470, Caxton is thought by ſome to have brought the art to Weſtminſter; but a modern author ſeems to make it appear that he did not bring it to England till the year 1474, and that the firſt book known to be printed in Engliſh was the Hiſtory of Troy.

Here we cannot forbear obſerving, that, though we allow the Germans the honour of having caſt the firſt moveable letters in metal, and of being the firſt printers, the praiſe of having brought theſe arts to their preſent perfection is chiefly owing to other nations. The Dutch, French and Engliſh have all contributed towards it; and in particular our countryman, Mr. William Caſlon, by mere dint of genius, without being bred up to the art of letter-founding, arrived at an excellency in it far beyond all his predeceſſors in England, and even what is uſually done of that kind in Holland, as the beautiful ſpecimens of his own and ſon's performances (not unknown to the curious) ſufficiently demonſtrate. By his ingenuity and unwearied application in this way, we may ſafely affirm, that he has done ſervice to his country, and to the learned world in general, and his reputation deſerves to laſt as long as the art of printing can preſerve it.

Method of Printing. The workmen employed in printing are, the compoſitors, who diſpoſe the letters from their caſes into words, lines, pages, &c. according to the author's copy; and the preſs-men, who apply ink on the forms, and take off the impreſſion.

The types, being caſt, are diſtributed, each kind by itſelf, among little ſquare cells or diviſions made in two wooden frames, called caſes, an upper and lower one. The cells of the upper caſe are 98 in number; and in theſe are diſpoſed the capitals, ſmall capitals, accented letters, figures, &c. In the cells of the lower caſe, which are 54, are diſpoſed the common running letters, with the points, commas, ſpaces, and quadrats.

Each caſe is placed a little a-ſlope, before which the compoſitor works ſtanding, and, holding in the left hand an iron inſtrument, called a compoſing-ſtick, with the right he picks up the letters, points, commas, &c. he has occaſion for, and, ranging them on a ſlip of braſs, called a rule, fitted to his compoſing-ſtick, he puts a ſpace to make a blank between each word, and ſo forms one line after another, till, the ſtick being full, he empties it out by means of the above braſs rule, upon another inſtrument of wood, called a galley, till it is of the ſize of the intended page; when he has got the proper number of pages made up, he arranges them duly upon the ſtone, round which he puts a ſquare iron frame, called a chaſe, and, locking all up by means of quoins and other wooden furniture, it becomes ready for the preſs.

The compoſing-ſtick (*plate* LXVI. *fig.* 3.) conſiſts of a plate or ſlip of iron, ſo contrived as to be made more or leſs long according to the intended width of the page. From one ſide ariſes a ledge *a a*, about half an inch high, running the whole length of the plate, the ſides of the letters reſting againſt it; from the ſame plate likewiſe ariſe three other leſs pieces *b* and *c c*; two of which *c c* are contrived to ſlide along it, ſo as that they may be approached or withdrawn at pleaſure to adjuſt the length of the line to the meaſure intended.

Where marginal notes, references, &c. are required in

in a work, the two ſliding pieces *c c* are opened in the compoſing-ſtick to a proper diſtance.

Before the workman proceeds to compoſe, the above-mentioned rule, or a thin ſlip of braſs, of the length of the line and of the ſame height with the letter, is placed in his compoſing-ſtick, for the letter in each line to bear immediately againſt, and is ſhifted, as each line in his ſtick is finiſhed.

Things thus prepared, the compoſitor having the copy before him, and the ſtick in his left hand, with the right he picks up the letters, ſpaces, &c. and places them againſt the braſs rule, while, with the left thumb, he preſſes them cloſe to the upper cheek, and ſo keeps them ſteady, while the other hand is conſtantly employed in ſetting in more letters.

A line being thus compoſed, if it end with a word or ſyllable, and fill the meaſure, there needs no more; otherwiſe, ſpaces are to be put between the ſeveral words to juſtify the line.

The ſpaces here uſed are a ſort of blanks, of the ſame dimenſions with the letters, only not ſo high, ſo that, when ſet in, they give no impreſſion. They are of ſeveral kinds, according to the dimenſions of the whites or intervals to be made by them, as quadrats to fill up the break at the end of paragraphs, &c. *m* quadrats, which are ſquare, and of the thickneſs of an *m*, ſerving to make the diſtance after a period; *n* quadrats, of the thickneſs of an *n*, to be placed after colons, ſemicolons, and commas; as alſo thick or thin ſpaces to be uſed in juſtifying the words as above.

For marginal notes, between the two ſliding pieces of the compoſing-ſtick are put little quadrated pieces of metal, called quotations, which are juſtified by other ſmaller pieces; a ſlip of ſcaleboard being placed from the top of the page to the bottom to keep the note and text at a due diſtance.

When the ſtick is full, he places the braſs rule before the laſt line, and with his two middle fingers ſqueezes the lines in the ſtick cloſe, his two fore-fingers at the ſame time being applied on the outſide of the rule; thus he lifts them out of the ſtick, and, clapping his two thumbs behind the firſt line, lifts them into the galley, ſo as not to break the lines. At the bottom of every page made up in the galley, the compoſitor ſets a line of quadrats, and at the end thereof, the firſt word of the enſuing page as a catchword; and, if it be the firſt page of the ſheet, one of the letters in alphabetical order for a ſignature.

The galley is a flat wooden inſtrument, of an oblong figure, proportionable to the length and breadth of the page, it conſiſts of an upper part, called the ſlice, whereby large pages, when compoſed and tied up with ſmall twine, as is always done, are ſlidden upon the ſtone; the other which is the body of the galley, is ledged on three ſides to contain the ſlice, the ledge not exceeding half an inch in height, that the compoſed page, riſing above it, may be tied up or bound down with twine, and removed without danger of breaking.

The pages are commonly firſt removed out of the galley into a coarſe wrapper of paper, and ſo ſucceſſively till the number of pages for the ſheet be completed: which done, he carries them to the impoſing or correcting ſtone, ſhifting them from the wrappers, and there ranges them in a chaſe, which is called impoſing.

The chaſe is a rectangular frame of different dimenſions, having two croſs iron bars, called a long and ſhort croſs, mortiſed at each end into the frame, ſo as to be taken out occaſionally. By the different ſituation of the croſſes, the chaſe is fitted for different volumes. For quarto's and octavo's, one traverſes the middle lengthwiſe, the other broadwiſe, ſo as to interſect the centre. For twelves and twenty-fours, the ſhort croſs is ſhifted nearer to one end of the chaſe. For folio's, the long croſs is taken out, and the ſhort one placed in the middle; and for broad-ſides, or ſheets printed only on one ſide, both croſſes are ſet aſide.

To dreſs the chaſe, or range the pages therein, they uſe a ſet of furniture, conſiſting of reglets or ſlips of wood, about half an inch high, that they may be lower than the letters. Some of theſe are placed at the top of the pages, called head-ſticks; others between them, to form the inner margin, called gutter-ſticks; others at the ſide, called ſide-ſticks; and others at the bottom, called foot-ſticks.

The pages being thus ranged, and the reglets applied between the letter and chaſe, the whole is locked up by means of ſmall pieces of wood cut wedgewiſe, called quoins, which are driven to a ſufficient tightneſs with a mallet and ſhooting-ſtick.

Before the form is quite locked up, they preſs it down by paſſing a ſmooth piece of wood, called the plainer, over the face of the letters, to make them ſtand even; and, when quite locked up, they raiſe and ſhake it a little on the ſtone, to ſee that all be faſt. In this condition the frame is called a form, containing more or fewer pages, according to the volume.

As there are two forms required for every ſheet, when both ſides are to be printed, they muſt be exactly of the ſame length and breadth; that is, the correſponding reglets, head-ſticks, &c. muſt be equal in both forms, that the pages may fall exactly on the back of one another, which is called regiſter.

Then the form is committed to the preſs-man; and, as it is impoſſible but there muſt be miſtakes in the work, either through the overſight of the compoſitor, or caſual intermixture of the letters in the caſes, after making a proof, it is delivered to the corrector, who reading it over and rectifying it by the copy, it is remanded to the compoſitor to be corrected accordingly; who unlocking the form on the correcting ſtone, by looſening the quoins, and ſpreading his corrected proof, ſo as that the lines thereof range with the reſpective ones of the metal; by running his eye along both, he eaſily ſpies where corrections are to be made; and accordingly he picks out the faulty letters, points, &c. with a ſharp-pointed ſteel bodkin, and puts the right ones in their place.

Where the alterations are conſiderable, particularly where inſertions or omiſſions are to be made, there uſually ariſes a neceſſity of over-running; in order to which they muſt return the letter back from the chaſe into the galley, and from that into the compoſing-ſtick, to be rectified accordingly.

If, for inſtance, one or more words, to be inſerted in a line, cannot be got in by changing the ſpaces for leſs ones, part of the line muſt be put back into the cloſe of the preceding one, or forward into the beginning of the ſubſequent one, or both, till room be got. If the inſertion be large, ſeveral lines will need to be over-run, either backward or forward, till a break is arrived at: when, if it be not got in, a line is to be driven out: and, to get in that line, the next pages, either backward or forward, muſt ſometimes be over-run before it can come in.

When an omiſſion is to be made, the contrary courſe muſt be taken. If it be but ſmall, the compoſitor takes it out, and drives out the remaining matter, by either enlarging his ſpaces, or beſtowing the beginning of the following, or cloſe of the preceding line therein. If it be conſiderable, he may be obliged to over-run ſeveral pages, before it can be driven out.

Preſs-man's Office, or PRINTING, *properly ſo called.* To work off the form thus prepared and corrected by the compoſitor, there are requiſite, paper, ink, and a preſs.

To fit the paper for uſe, it is to be firſt moiſtened, by dipping ſeveral ſheets together in water; theſe are afterwards laid in a heap over one another; and, to make them take the water equally, are all preſſed cloſe down with a weight a-top. And this wetting muſt be according to the quality of the paper, and ſize of the letter; ſmall letter and ſtiff paper require moſt wetting.

A PRINTING-*Houſe*, is a place deſtined for printing, and fitted up for that purpoſe with preſſes, caſes, and other furniture.

The moſt conſiderable printing-houſes are thoſe of the Louvre and Vatican. Out of both theſe printing-houſes have come forth very beautiful editions of the ancient authors, as alſo from that of Plantin and the Elzevirs.

PRINTING-*Ink*, is of two kinds, black and red: the laſt occaſionally uſed in title-pages, calendars, &c. the firſt for the body of books.

For black Ink, the compoſition which the printers have from other hands, is 100 pounds of nut or linſeed oil, being brought by boiling to the conſiſtence of a ſyrup, and purified by throwing into it two pounds of coarſe bread, and about a dozen onions. Then 30 or 35 pounds of turpentine are boiled a-part, till ſuch time as they

find,

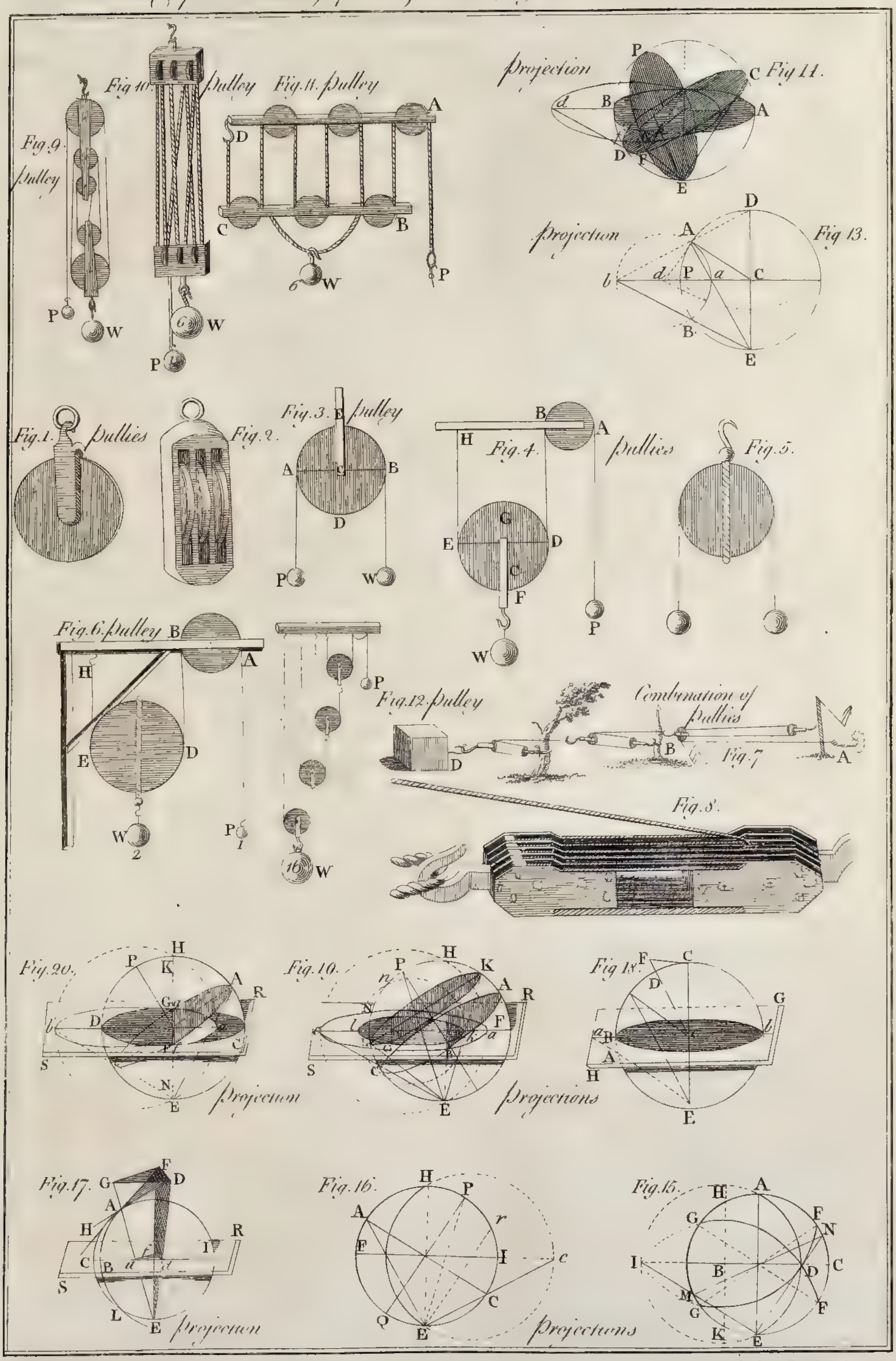


Fig. 9. Pulley
Fig. 10. Pulley
Fig. 11. Pulley
Projection
Fig 14.
Projection
Fig 13.
Fig. 1. Pullies
Fig. 2.
Fig. 3. Pulley
Fig. 4.
Pullies
Fig. 5.
Fig. 6. Pulley
Fig. 12. Pulley
Combination of Pullies
Fig. 7
Fig. 8.
Fig. 20.
Projection
Fig. 10.
Projections
Fig 18.
Fig. 17.
Projection
Fig. 16.
Projections
Fig. 15.

find, upon its cooling on paper, that it breaks clean, like glafs, without pulverizing; for if it pulverize eafily, it is a fign that it is burnt. The oil and turpentine thus prepared, the firft is gently poured half cold into the latter, and the two ftirred together with a ftick, till they be well mixed. After which the compofition, which is called the varnifh, is fet by to be ufed occafionally. To proceed to make ink, they take a quantity of this mixture, and add thereto a certain quantity of lamp-black, working it up with a kind of wooden brayer, till the whole be incorporated into a kind of pulp; which is the printing ink for ufe.

Its ftrength or thicknefs is always to be proportioned to that of the paper and warmth of the weather; and its ftrength or weaknefs depends on the greater or lefs degree of coction of the varnifh.

For red Ink, they ufe the fame materials as for black, excepting that inftead of lamp-black, they add a proper quantity of vermilion, the luftre of which fome hold to be heightened by mixing and incorporating the bignefs of a nut of fifh-glue, brandy, or the white of an egg with the ink.

The ink is applied upon the forms by means of balls, which are a kind of wooden funnels, the cavities whereof are filled with wool covered with leather nailed on the wood. One of thefe the prefsman takes in each hand, and applying them on the ink-block, in order to charge them with ink, he rubs the one againft the other to diftribute the ink equally; and at laft fmears over the form by beating or dabbing them feveral times over the whole face thereof: this leaves the form in a condition to be paffed under the prefs, with the moiftened paper laid thereon.

PRINTING-*Prefs*, a very complex machine: its two principal parts, each of which confifts of feveral others, are the body of the prefs, which ferves to give the pinch or ftroke for the impreffion; and the carriage on which the form is laid to undergo the fame.

The body confifts of two ftrong cheeks (*plate* LXVI. *fig.* 6.) placed perpendicularly, and joined together by four crofs pieces or planks.

The two ftrong cheeks *a a*, are placed perpendicularly, and joined together by four crofs-pieces; the cap *b*; the head *c*, which is moveable being partly fuftained by two iron-pins, or long bolts; that pafs the cap; the fhelves *d d*, which ferve to keep fteady a part called the hofe, and the winter *e*, which bears the carriage, and fuftains the effort of the prefs beneath. The fpindle *f* is an upright piece of iron pointed with fteel, having a male fcrew which goes into the female one in the head about four inches. Through the eye *g* of this fpindle is faftened the bar *k*, by which the preffman makes the impreffion. Part of the fpindle is inclofed in a fquare wooden frame called the hofe, *h*, and its point works into a brafs-pan fupplied with oil, which is fixed to an iron plate let into the top of the platten. At each corner of the hofe, there is an iron-hook faftened with pack-thread to thofe at each corner of the platten *i*, in fuch a manner as to keep it perfectly level. The carriage *l l* is placed a foot below the platten, having its fore-part fupported by a prop called the fore-ftay, while the other refts on the winter. On this carriage, which fuftains the plank, are nailed two long iron bars or ribs, and on the plank are nailed fhort pieces of iron or fteel called cramp-irons, equally tempered with the ribs, and which flide upon them when the plank is turned in or out. Under the carriage is fixed a long piece of iron called the fpit, with a double wheel in the middle, round which leather-girts are faftened, nailed to each end of the plank; and to the outfide of the fpit is fixed a rounce *m*, or handle to turn round the wheel. Upon the plank is a fquare frame or coffin, in which is inclofed a polifhed ftone on which the form *n* is laid; at the end of the coffin are three frames, *viz.* the two tympans and frifket: the tympans *o* are fquare, and made of three flips of very thin wood, and at the top a piece of iron ftill thinner; that called the outer tympan is faftened with hinges to the coffin; they are both covered with parchment; and between the two are placed blankets which are neceffary to take off the impreffion of the letters upon the paper. The frifket *p* is a fquare frame of thin iron, faftened with hinges to the tympan; it is covered with paper cut in the neceffary places, that the fheet, which is put between the frifket and the great or outward tympan, may receive the ink, and that nothing may hurt the margins. To regulate the margins, a fheet of paper is faftened upon this tympan, which is called the tympan-fheet, and on each fide is fixed an iron point, which makes two holes in the fheet, which is to be placed on the fame points, when the impreffion is to be made on the other fide. In preparing the prefs for working, the parchment which covers the outer tympan is wetted till it is very foft, and in order to render the impreffion more equable; the blankets are then put in, and fecured from flipping by the inner tympan; then while one preffman is beating the letter with the balls *q*, covered with ink taken from the ink-block: the other perfon places a fheet of white paper on the tympan-fheet, turns down the frifket upon it to keep the paper clean and prevent its flipping; then bringing the tympans upon the form, and turning the rounce, he brings the form with the ftone, *&c.* weighing about 300 pounds weight, under the platten; pulls with the bar, by which means the platten preffes the blankets and paper clofe upon the letter, whereby half the form is printed; then eafing the bar, he draws the form ftill forward, gives a fecond pull, and letting go the bar, turns back the form, takes up the tympans and frifket, takes out the printed fheet and lays on a frefh one; and this is repeated till he has taken off the impreffion upon the full number of fheets the edition is to confift of. One fide of the fheet being thus printed, the form for the other is laid upon the prefs, and worked off in the fame manner.

The number of fheets of the edition being complete, and the form to be feparated to reftore the letter into the cafes, they firft wafh it in boiling lye to take out the remains of the ink, fcouring it with a brufh, and then with fair water. This done, it is carried to a wooden frame to be unlocked, and the furniture, i. e. the fticks, taken off to difengage it from the chafe. Then the compofitor taking out feveral lines at once upon a little wooden ruler, he replaces each letter in its proper box, to be again ufed in the remainder of the impreffion; which laft operation they call diftribution.

They have likewife rules for black lines, borders, and head and tail pieces accommodated to the feveral kinds of letters. The rules for black lines are of brafs, and made exactly the height of the letter; otherwife they will either hinder the neighbouring letters from printing, or will themfelves be hindered by them. Thefe the compofitor cuts into proper lengths, as the work requires.

The borders are a kind of ornaments in form of long bars, ferving for the divifions of books, chapters, &c. their depth is proportioned to the letter, and their length adjufted to the page; for, being compofed of feveral moveable pieces, it is eafy lengthening or fhortening them.

The head and tail pieces, cut either in wood or pewter, are compartments ufed at the beginning and ending of books. The initial letters are fometimes cut in wood, and figured, fometimes caft like the other characters.

For the conveniency of the binding, the printers had early recourfe to fignatures, i. e. letters of the alphabet placed at the bottom of the fheet, which fhew the order they are to be bound in, as well as whether the quires be complete. The catch-words ferve nearly the fame purpofe: thefe are the firft words of each page, which are inferted at the bottom of the preceding pages.

The number of pages are equally ferviceable to the reader and the binder, to guide to references, and to warrant the book duly bound and collated: fome printers formerly put them at the bottoms of the pages, but cuftom has carried it for the tops.

As to the faults which efcape the corrector and compofitor, they are ufually noted in what we call errata. The ancient editions had no errata, but in lieu thereof corrected the faults in each printed copy with a pen; which was eafy enough in thofe days, though impracticable now.

Chinefe PRINTING. Books are printed in China from wooden blocks cut like thofe ufed among us in printing of callico, paper cards, &c. The blocks are made of a fmooth, firm, clofe wood, of the fize of the leaf required. On the face fide they glue a paper, upon which fome able penman draws out the feveral letters and characters with a Chinefe pen, which is a kind of pencil. When finifhed, the block is put into the hands of a fculptor, who following the feveral ftrokes of the writer with his gravers, &c. makes them all appear in relievo. When the cutting is

is finiſhed, they moiſten what remains of the paper, and rub it gently off.

The ink they uſe in printing is the ſame with the common Chineſe ink wherewith they write, and is made of lamp-black mixed up with oil. Their preſs reſembles our rolling-preſs. Their paper is made of the inner rind of a kind of ruſhes beat up with water into a pulp or paſte, and formed in moulds like ours.

Rolling-Preſs PRINTING is employed in taking off prints or impreſſions from copper-plates engraven, etched, or ſcraped as in mezzotintos.

This art is ſaid to have been as ancient as the year 1540, and to owe its origin to Finiguerra, a Florentine goldſmith, who pouring ſome melted brimſtone on an engraven plate, found the exact impreſſion of the engraving left in the cold brimſtone, marked with black taken out of the ſtrokes by the liquid ſulphur: upon this he attempted to do the ſame on ſilver plates with wet paper, by rooling it ſmoothly with a roller; and this ſucceeded: but this art was not uſed in England till the reign of king James I. when it was brought from Antwerp by Speed. The form of the rolling-preſs, the compoſition of the ink uſed therein, and the manner of applying both in taking off prints, are as follow:

The rolling-preſs (*plate* LXVI. *fig.* 7.) may be divided into two parts, the body and carriage: the body conſiſts of two wooden cheeks, placed perpendicularly on a ſtand or foot, which ſuſtains the preſs. From the foot likewiſe ariſe four other perpendicular pieces, joined by other croſs or horizontal ones, which ſerve to ſuſtain a ſmooth even plank or table, about four feet and a half long, two feet and a half broad, and an inch and a half thick. Into the cheeks go two wooden cylinders or rollers, about ſix inches in diameter, borne up at each end by the cheeks, whoſe ends, which are leſſened to about two inches diameter, and called trunnions, turn in the cheeks between two pieces of wood in form of half moons, lined with poliſhed iron to facilitate the motion. Laſtly, to one of the trunnions of the upper roller is faſtened a croſs, conſiſting of two levers, or pieces of wood traverſing each other, the arms of which croſs ſerve inſtead of the bar or handle of the letter-preſs, by turning the upper roller, and when the plank is between the two rollers, giving the ſame motion to the under one, by drawing the plank forward and backward.

The ink uſed for copper-plates, is a compoſition made of the ſtones of peaches and apricots, the bones of ſheep, and ivory, all well burnt, and called Frankfort-black, mixt with nut oil that has been well boiled, and ground together on a marble, after the ſame manner painters do their colours.

The method of printing from copper-plates is as follows: they take a ſmall quantity of this ink on a rubber made of linen-rags, ſtrongly bound about each other, and therewith ſmear the whole face of the plate as it lies on a grate over a charcoal fire. The plate being ſufficiently inked, they firſt wipe it over with a foul rag, then with the palm of the left hand, and then with that of the right; and to dry the hand and forward the wiping, they rub it from time to time on whiting. In wiping the plate perfectly clean, yet without taking the ink out of the engraving, the addreſs of the workman conſiſts. The plate thus prepared is laid on the plank of the preſs; over the plate is laid the paper, firſt well moiſtened, to receive the impreſſion, and over the paper two or three folds of flannel. Things thus diſpoſed, the arms of the croſs are pulled, and by that means, the plate with its furniture, paſſed through between the rollers, which pinching very ſtrongly, yet equally, preſſes the moiſtened paper into the ſtrokes of the engraving, whence it licks out the ink.

PRIOR, in general, ſomething before, or nearer the beginning than another, to which it is compared.

PRIOR, more particularly denotes the ſuperior of a convent of monks, or the next under the abbot.

Grand PRIOR, is the ſuperior of a large abbey, where ſeveral ſuperiors are required.

PRISAGE, *Priſagium*, that part or ſhare which belongs to the king, or admiral, out of prizes taken at ſea from an enemy; this is uſually a 10th part. See PRISE.

PRISCILLIANISTS, in church hiſtory, Chriſtian hereticks, ſo called from their leader Priſcillian, a Spaniard by birth, and biſhop of Avila. He is ſaid to have practiſed magick, and to have maintained the principal errors of the Manichees; but his peculiar tenet was, that it is lawful to take falſe oaths, in order to ſupport one's cauſe and intereſt.

PRISE, or PRIZE, in navigation, a veſſel taken at ſea from the enemies of a ſtate, or from pirates, either by a man of war, or merchantſhip, having a commiſſion for that purpoſe. Veſſels are looked on as prize, if they fight under any other ſtandard than that of the ſtate from which they have their commiſſion; if they have no charter-party, invoice, or bill of lading a-board; if loaded with effects belonging to the king's enemies, or with contraband goods. Thoſe of the king's ſubjects recovered from the enemy, after remaining 24 hours in their hands, are deemed lawful prize. Veſſels that refuſe to ſtrike may be conſtrained, and, if they make reſiſtance and fight, become lawful prize, if taken.

PRISE, in our ſtatutes, denotes things, as corn, and other proviſions taken of the ſubject by the king's purveyors, at lower rates than ordinary, for maintenance of the king's houſhold, garriſons, &c.

PRISM, *Priſma*, in geometry, an oblong ſolid contained under more than four planes, whoſe baſes are equal, parallel, and alike ſituated.

The priſm is generated by the motion of a rectilinear figure, as A, B, C (*plate* LXVI. *fig.* 4.) deſcending always parallel to itſelf, along the right line AE.

If the deſcribent be a triangle, the body is ſaid to be a triangular priſm; if ſquare, a quadrangular one, &c.

From the geneſis of the priſm, it is evident it has two equal and oppoſite baſes; and it is terminated by as many parallelograms as the baſe conſiſts of ſides; and that all the ſections of a priſm parallel to its baſe are equal. Every triangular priſm may be divided into three equal pyramids.

PRISM, in dioptricks, is a glaſs in form of a triangular priſm, much uſed in experiments about the nature of light and colours. See LIGHT.

The phænomena and uſe of the priſm ariſe from its ſeparating the rays of light in their paſſage through it.

The more general of theſe phænomena are as follow, for to enumerate all would be endleſs; and even theſe are ſufficient to demonſtrate, that colours do not either conſiſt in the contorſion of the globules of light, as Des Cartes imagined; nor in the obliquity of the pulſes of the ethereal matter, as Hook fancied; nor in the conſtipation of light, and its greater or leſs concitation, as Dr. Barrow conjectured; but that they are original and unchangeable properties of light itſelf. See COLOURS.

PRISMOID, *Priſmoides*, in geometry, a ſolid figure, bounded by ſeveral planes, whoſe baſes are right-angled parallelograms, parallel, and alike ſituated.

PRISON, the ſame with GAOL, which ſee.

PRISONER, is one reſtrained of his liberty upon any action, civil or criminal, or upon commandment.

One, again, may be priſoner either upon matter of fact, or record; the former is when a perſon is committed by an arreſt; the latter is when a perſon, being preſent in court, is by the court committed to priſon.

PRIVATION, *Privatio*, the abſence or want of ſomething neceſſary.

In the canon law, it denotes an interdiction or ſuſpenſion.

PRIVATIVE, in grammar, a particle, which when prefixed to a word, changes it into a contrary ſenſe.

Among the Greeks, the α is uſed as a privative; and, among the Latins, in. The Engliſh, French, &c. borrow both the Greek and Latin privatives.

PRIVATIVE *Quantity*, or *Negative Quantity*, in algebra, denotes a quantity leſs than nothing, in oppoſition to affirmative or poſitive; and is expreſſed by the ſign ($-$) minus prefixed thereto.

PRIVILEGE, *Privilegium*, is any kind of right or advantage attached to a perſon, or employment, excluſive of others.

PRIVILEGE, in law, a particular right granted to a perſon, place, community, &c. whereby they are exempted from the rigour of the common laws.

It is either perſonal or real; the former is that which is granted to any particular perſon, againſt or beyond the common courſe of law, as the exemption of a member of parliament and his ſervants from an arreſt during the ſeſſions, and for a certain time before and after. Real privilege is a franchiſe granted to a place, as that granted to our univerſities, that no member thereof may be ſummoned

moned to Weſtminſter-hall upon any contract made within their own precincts; an exemption from arreſts within the verge of the court, that is in or near the king's reſidence, &c.

PRIVILEGE, in commerce, a permiſſion from a prince, &c. to make and ſell a certain merchandize, or engage in a certain commerce, either excluſively of others, or concurrently with them.

PROBABILITY, the appearance of agreement or diſagreement between two ideas, by the intervention of proofs, whoſe connection is not conſtant or immutable.

PROBABILITY, in poetry, implies the appearance of truth in the fable or action of a poem.

PROBATE *of a Will*, is the proving a will before the judges of the eccleſiaſtical court.

PROBATION, in the univerſities, is the examination of a ſtudent who is going to take a degree.

PROBATION, in a monaſtick ſenſe, ſignifies the year of novitiate which a religious muſt paſs in a convent, to prove his virtue and vocation, and whether he can bear the ſeverities of the rule.

PROBATIONER, in the church of Scotland, a ſtudent in divinity, who bringing a certificate from a profeſſor in an univerſity of his good morals, and his having performed his exerciſes to approbation, is admitted to undergo ſeveral trials.

PROBATOR, in law, one who undertakes to prove a crime charged upon another; properly, an accomplice in the crime who impeaches others.

PROBATUM EST, *it is proved*, a term frequently ſubjoined to a receipt for the cure of ſome diſeaſe.

PROBE, a ſurgeon's inſtrument for examining the circumſtances of wounds, ulcers, and other cavities, ſearching for ſtones in the bladder, &c.

PROBLEM, in logick, a propoſition that neither appears abſolutely true or falſe; and, conſequently, may be aſſerted either in the affirmative or negative.

PROBLEM, in geometry, is a propoſition, wherein ſome operation or conſtruction is required; as to divide a line or angle, erect or let fall perpendiculars, &c.

PROBLEM, in algebra, is a queſtion or propoſition which requires ſome unknown truth to be inveſtigated, and the truth of the diſcovery demonſtrated.

PROBLEMATICAL RESOLUTION, in algebra, a method of ſolving difficult queſtions by certain rules, called canons.

PROBOSCIS, in natural hiſtory, is the trunk or ſnout of an elephant, and ſome other animals and inſects. Flies, gnats, &c. are furniſhed with a proboſcis, or trunk; by means of which they ſuck the blood of animals, the juice of vegetables, &c. for their food.

PROCEED, among merchants, whatever ariſes from any thing.

PROCESS, in law, denotes the proceedings in any cauſe, real or perſonal, civil or criminal, from the original writ to the end thereof.

PROCESS, in chymiſtry, the whole courſe of an experiment or ſeries of operations, tending to produce ſomething new.

PROCESS, *Proceſſus*, in anatomy, denotes any protuberance or eminence in a bone.

PROCLAMATION, a publick notice given of any thing of which the king thinks proper to advertiſe his ſubjects.

PROCONSUL, a Roman magiſtrate, ſent to govern a province with conſular authority.

PROCTOR, a perſon commiſſioned to manage another perſon's cauſe, in any court of civil or eccleſiaſtical law. The proctor's of the clergy, are the repreſentatives choſen by the clergy, to ſit in the lower houſe of convocation: of theſe are two for each dioceſe, and one for each collegiate church.

PROCTORS, in an univerſity, are two officers choſen from among the ſtudents to ſee good order and exerciſes daily performed.

PROCURATION, or PROCURACY, an act or inſtrument by which a perſon is impowered to treat, tranſact, receive, &c. in another perſon's name.

This word is now little uſed in this ſenſe, except in the caſe of a perſon who collects the fruits of a benefice for another.

The ſame word is uſed for certain ſums of money annually paid by pariſh-prieſts to the biſhop, or archdeacon, on account of viſitation, and which, in former times, were paid in neceſſary victuals and proviſions for the viſitor and his attendants.

PROCURATOR, a perſon who has a charge committed to him to act for another.

PROCYON, in aſtronomy, a fixed ſtar of the ſecond magnitude, in the conſtellation called canis minor. See CANIS.

PRODUCING, in geometry, ſignifies the drawing out a line further till it has any aſſigned length.

PRODUCT, in arithmetick and geometry, the factum of two or more numbers, or lines, &c. into one another: thus $5 \times 4 = 20$, the product required.

In lines it is always (and in numbers ſometimes) called the rectangle between the two lines, or numbers, multiplied by one another.

PRODUCTION, in anatomy, the ſame with proceſs. See PROCESS.

PROEM, a term ſometimes uſed for prelude or preface.

PROEMPTOSIS, in aſtronomy, the appearance of the new moon a day later, by reaſon of the lunar equation. See MOON.

PROFESSOR, in the univerſities, a perſon who teaches or reads publick lectures in ſome art or ſcience from a chair for the purpoſe.

PROFILE, in architecture, the draught of a building, fortification, &c. wherein are expreſſed the ſeveral heights, widths, and thickneſſes, ſuch as they would appear, were the building cut down perpendicularly from the roof to the foundation. It is alſo called ſection, orthographical ſection, and, by Vitruvius, ſciagraphy.

This is the ſame as elevation, in oppoſition to a plan, ichnography.

PROFILE alſo denotes the outline of a figure, building, member of architecture, &c. Hence profiling ſometimes denotes deſigning or deſcribing the member with a rule, compaſs, &c.

PROFILE, in ſculpture and painting, denotes a head, portrait, &c. when repreſented ſideways, or in a ſide view. On almoſt all medals, faces are repreſented in profile.

PROGNOSTICK, προγνωσις, among phyſicians, ſignifies a judgment concerning the event of a diſeaſe, as whether it ſhall end in life or death, be ſhort or long, mild or malignant, &c.

PROGRESSION, in general, denotes a regular advancing, or going forward, in the ſame courſe and manner.

PROGRESSION, in mathematicks, is either arithmetical or geometrical. Continued arithmetick proportion, where the terms do increaſe and decreaſe by equal differences, is called arithmetick progreſſion:

$$\text{thus } \left\{\begin{array}{l} a,\ a+d,\ a+2d,\ a+3d,\ \text{\&c. increaſing} \\ a,\ a-d,\ a-2d,\ a-3d,\ \text{\&c. decreaſing} \end{array}\right\} \text{by the difference } d.$$

$$\text{In numbers } \left\{\begin{array}{l} 2,\ 4,\ 6,\ 8,\ 10,\ \text{\&c. increaſing} \\ 10,\ 8,\ 6,\ 4,\ 2,\ \text{\&c. decreaſing} \end{array}\right\} \text{by the difference } 2.$$

But ſince this progreſſion is only compound of two ſeries, viz.

$$\text{of } \left\{\begin{array}{llllll} \text{Equals} & a, & a, & a, & a, & a, \\ \text{Arith. proportionals} & 0, & \pm d, & \pm 2d, & \pm 3d, & \pm 4d, \end{array}\right\} \text{\&c.}$$

Therefore the moſt natural arithmetick progreſſion is that which begins with 0: as,

$$0,\ \pm d,\ \pm 2d,\ \pm 3d,\ \pm 4d,\ \left\{\begin{array}{l} \text{increaſing.} \\ \text{decreaſing.} \end{array}\right.$$

$$\text{In any arithmetical progreſſion, if } \left\{\begin{array}{c} a \\ d \\ n \\ l \\ s \end{array}\right\} \text{ be the } \left\{\begin{array}{l} \text{firſt term,} \\ \text{common difference,} \\ \text{number of terms,} \\ \text{laſt term,} \\ \text{ſum of all the terms;} \end{array}\right\} \text{ then any three of theſe terms being given, the other two are eaſily found.}$$

And

And the ſeveral caſes are reducible into 10 propoſitions, which are all ſolved by the two following lemmata.

Lemma I. In any arithmetick progreſſion, it is, $1 : \frac{n}{2} :: a+l : s$

Lemma II. In any arithmetical progreſſion, it is, $1 : n-1 :: d : l-a$.

Geometrick PROGRESSION, or continued geometrick proportion, is when the terms do increaſe or decreaſe by equal ratios: thus,

$$\left.\begin{array}{l} a,\ ar,\ arr,\ arrr, \text{ \&c. increaſing} \\ a,\ \frac{a}{r},\ \frac{a}{rr},\ \frac{a}{rrr}, \text{ \&c. decreaſing} \end{array}\right\} \text{from a continual} \left\{\begin{array}{l} \text{multiplication} \\ \text{diviſion} \end{array}\right\} \text{by } r.$$

$$\left.\begin{array}{l} 2,\ 4,\ 8,\ 16,\ 32,\ 64, \text{ increaſing} \\ 64,\ 32,\ 16,\ 8,\ 4,\ 2, \text{ decreaſing} \end{array}\right\} \text{from a continual} \left\{\begin{array}{l} \text{multiplication} \\ \text{diviſion} \end{array}\right\} \text{by } 2.$$

But ſince this progreſſion is only a compound of two ſeries, viz.

$$\text{of} \left\{\begin{array}{ll} \text{Equals} & a,\ a,\ a,\ a,\ a,\ a, \\ \text{Geometrick proportion,} & 1,\ r,\ r^2,\ r^3,\ r^4,\ r^5, \end{array}\right\} \text{\&c.}$$

therefore the moſt natural progreſſion is that which begins with unity.

$$\left.\begin{array}{ll} \text{as} & \frac{1}{1},\ \frac{r}{1},\ \frac{r^2}{1},\ \frac{r^3}{1},\ \frac{r^4}{1},\ \frac{r^5}{1}, \\ \text{that is,} & 1,\ r,\ r^2\ \ r^3\ \ r^4\ \ r^5 \end{array}\right\} \text{\&c. increaſing.}$$

$$\left.\begin{array}{ll} \text{as} & \frac{1}{1},\ \frac{1}{r},\ \frac{1}{r^2},\ \frac{1}{r^3},\ \frac{1}{r^4},\ \frac{1}{r^5}, \\ \text{that is,} & 1,\ r^{-1}\ \ r^{-2}\ \ r^{-3}\ \ r^{-4}\ \ r^{-5} \end{array}\right\} \text{\&c. decreaſing.}$$

In geometrick progreſſion,

$$\text{If} \left\{\begin{array}{c} a \\ r \\ n \\ l \\ s \end{array}\right\} \text{be the} \left\{\begin{array}{l} \text{firſt term,} \\ \text{ratio,} \\ \text{number of terms,} \\ \text{laſt term,} \\ \text{ſum of all the terms;} \end{array}\right\} \begin{array}{l} \text{then any three of theſe terms being given,} \\ \text{the other two are eaſily found.} \end{array}$$

And the ſeveral caſes are reducible to 10 propoſitions, which are ſolved by the following lemmata:

Of increaſing progreſſions.

Lem. I. In an increaſing geometrick progreſſion $a, ar, ar^2, ar^3, ar^4, ar^5$, &c. it is $1 : r :: s-l : s-a$.

Lem. II. In an increaſing geometrick progreſſion it is $1 : r^{n-1} :: a : l$.

PROHIBITED GOODS, in commerce, the ſame with contraband goods.

PROHIBITION, in law, is a writ that iſſues out of the Chancery, King's-bench, or Common-pleas, to prohibit ſome other court, either ſpiritual or ſecular, to proceed in a cauſe there depending, upon a ſuggeſtion that the cauſe does not belong to the court.

PROJECTILES, are ſuch bodies as being put in a violent motion by any great force, are then caſt off or let go from the place where they received their quantity of motion; as a ſtone thrown from a ſling, an arrow from a bow, a bullet from a gun, &c.

It is uſually taken for granted by thoſe who treat of the motion of projectiles, that the force of gravity near the earth's ſurface is every where the ſame, and acts in parallel directions; and that the effect of the air's reſiſtance upon very heavy bodies, ſuch as bombs and cannon-balls, is too ſmall to be taken into conſideration.

The famous Sir Iſaac Newton has ſhewn, that the gravity of bodies which are above the ſuperficies of the earth, is reciprocally as the ſquares of their diſtances from its centre; but the theorems concerning the deſcent of heavy bodies, demonſtrated by Gallilæus, Huygens, and others, are built upon this foundation, that the action of gravity is the ſame at all diſtances; and the conſequences of this hypotheſis are found to be very nearly agreeable to experience. For it is obvious, that the error ariſing from the ſuppoſition of the gravity's acting uniformly, and in parallel lines, muſt be exceeding ſmall; becauſe even the greateſt diſtance of a projectile above the ſurface of the earth, is inconſiderable, in compariſon of its diſtance from the centre, to which the gravitation tends. But then, on the other hand, it is very certain, that the reſiſtance of the air to very ſwift motions, is much greater than it has been commonly repreſented. Nevertheleſs, in the application of this doctrine to gunnery, if the amplitude of the projection, anſwering to one given elevation, be firſt found by experiment (which we ſuppoſe) the amplitudes in all other caſes, where the elevations and velocities do not very much differ from the firſt, may be determined to a ſufficient degree of exactneſs, from the foregoing hypotheſis: becauſe, in all ſuch caſes, the effects of the reſiſtance will be nearly as the amplitudes themſelves; and were they accurately ſo, the proportions of the amplitudes would be the very ſame as in vacuo.

Every projectile is acted upon by theſe two forces or powers, viz. the impetus of the projectile force, and that of gravity. By the firſt, the body paſſes over equal ſpaces, A B, B C, C D, &c. (*plate* LXVI. *fig.* 2.) in equal times; and, by the ſecond, it deſcends through the ſpaces A G, A H, A I, which are as the ſquares of the times; and, therefore, by the two forces compounded, the body will deſcribe, not a right line, but a curve A Q; and of that ſort which we call a parabola; and this will be the caſe in all directions but that in the perpendicular, when the path of the projectile will be (to appearance) a right line. The greater the angle of elevation K A M (*fig.* 5.) of the cannon is, the greater will be the height D B to which the projected body will riſe. Alſo the greater will be the diſtance or amplitude of the projection, till the ſaid angle becomes equal to 45° K A O; upon which elevation, the random A Q will be the greateſt poſſible, and equal to twice the altitude A G of the perpendicular projection. On any elevation A M or A R, equally above or below 45° as on 40 and 50, 30 and 60, 20 and 70°, the random A C will be the ſame; which caſe an engineer frequently finds of great uſe.

If the object be ſituated above the horizon, then, in order to ſtrike it with the leaſt impetus, let a piece of looking-glaſs be fixed to the cannon perpendicular to its axis; and holding a plumb-line over the glaſs directly under the eye, the cannon is to be elevated till the object appears exactly under the plummet, and there fixed; if then it be diſcharged, it will ſtrike the object required.

From what has been ſaid, we may eaſily underſtand how a body projected upright from the earth's ſurface, does really deſcribe a parabola, though, to appearance, it aſcends and deſcends in a right line. For it is urged by two forces, viz. the projectile upwards, and the force ariſing from the motion of the earth about its axis from weſt to eaſt; in which caſe it muſt neceſſarily deſcribe a parabola.

PROJECTION, in mechanicks, the act of communicating motion to a body, from thence called projectile. See the preceding article.

PROJECTION, in perſpective, is the appearance or repreſentation of an object on the perſpective plane.

PROJECTION *of the Sphere*, implies the repreſentation of the different circles, &c. of the ſphere on a plane ſurface, ſimilar to what they really appear to the eye placed at ſome given diſtance; and is either orthographick, or ſtereographick.

The former, or orthographick projection, ſuppoſes the eye placed at an infinite diſtance; whereas, in the ſtereographick projection, it is ſuppoſed to be only 90° diſtant from the primitive circle, or placed in its pole, and thence viewing the circles on the ſphere. The primitive circle is that great circle which limits or bounds the repreſentation or projection; and the place of the eye is called the projecting point.

The laws of the orthographick projection are theſe:

1. The rays by which the eye, placed at an infinite distance, perceives any objects, are parallel.

2. A right line, perpendicular to the plane of the projection, is represented by a point, where it cuts the plane of the projection.

3. A right line, as A B, or C D, (*plate* LXVIII. *fig.* 1.) not perpendicular, is projected into a right line, as F E and G H, and is always comprehended between the extreme perpendiculars A F and B E, and C G and D H.

4. The projection of the right line, A B, is the greatest when it is parallel to the plane of projection; being projected in a right line equal to itself.

5. But an oblique line is always projected into one less than itself; and the more so, the nearer it approaches to a perpendicular, which, as already observed, is projected into a point.

6. A plane surface, as A B C D (*fig.* 2.) at right angles to the plane of the projection, is projected into the right line A B, in which it cuts the plane of the projection; and any arch as B *c*, *c c*, or *c* A, is projected into the corresponding lines B *o*, *o o*, and *o* A.

7. A circle parallel to the plane of projection, is represented by a circle equal to itself; and a circle oblique to the plane of projection, is represented by an ellipsis; for the method of putting these rules in practice, see MAP.

As to the stereographick projection, its laws are these:

1. The representations of all circles not passing through the projecting point, will be circles. Thus, let A C E D B (*fig.* 3, 4. and also *plate* LXVII. *fig.* 20.) represent a sphere, cut by a plane R S, passing through the centre I, at right angles, to the diameter E H, drawn from E, the place of the eye; and let the section of the sphere by the plane R S, be the circle C F D L, whose poles are H and E. Suppose now A G B is a circle on the sphere to be projected, whose pole most remote from the eye is P; and the visual rays from the circle A G B, meeting in E, form the cone A G B E, whereof the triangle A E B is a section through the vertex E, and diameter of the base A B: then will the figure *a g b f*, which is the projection of the circle A G B, be itself a circle: for if the plane R S is supposed to revolve on the line C D, till it coincides with the plane of the circle A C E B; then will the circle C F D L coincide with the circle C E D H, and the projected circle *a f b g* with the circle *a* N *b* K. Hence, the middle of the projected diameter is the centre of the projected circle, whether it be a great circle or a small one; the poles and centres of all circles, parallel to the plane of projection, fall into the centre of the projection; and all oblique great circles cut the primitive circle in two points diametrically opposite.

2. The projected diameter of any circle subtends an angle at the eye equal to the distance of that circle from its nearest pole, taken on the sphere; and that angle is bissected by a right line, joining the eye and that pole. Thus let the plane R S (*fig.* 19.) cut the sphere H F E G, through its centre I; and let A B C be any oblique great circle, whose diameter A C is projected in *a c*; and K O L, any small circle parallel to A B C, whose diameter K L is projected in *k l*. The distances of those circles from their pole P, being the arches A H P, K H P; and the angles *a* E *c*, *k* E *l*, are the angles at the eye, subtended by their projected diameters, *a c*, *k l*. Then is the angle *a* E *c* measured by the arch A H P, and the angle *k* E *l* measured by the arch K H P, and those angles are bissected by E P.

3. Any point of a sphere is projected at the distance of the tangent of half the arch intercepted between that point and the pole opposite to the eye, from the centre of projection; the semi-diameter of the sphere being radius. Thus, let C *b* E B (*fig.* 18.) be a great circle of the sphere, whose centre is *c*, G H the plane of projection cutting the diameter of the sphere in *b*, B; E C, the poles of the section by that plane; and *a*, the projection of A. Then is *c a*=the tangent of half the arch A C, as is evident by drawing C F=the tangent of half that arch, and joining *c* F.

4. The angle made by two projected circles, is equal to the angle which these circles make on the sphere; for let I A C E and A B L (*fig.* 17.) be two circles on a sphere intersecting in A; E the projecting point; and R S the plane of projection, wherein the point A is projected in *a*, in the line I C the diameter of the circle A C E. Also let D A, F A, be tangents to the circles A C E, A B L. Then will the projected angle *d a f* be equal to the spherical angle B A C.

5. The distance between the poles of the primitive circle and an oblique circle, is equal to the tangent of half the inclination of those circles; and the distance of their centres is equal to the tangent of their inclination, the semi-diameter of the primitive being radius.

For let A C (*fig.* 16.) be the diameter of a circle, whose poles are P and Q, and inclined to the plane of projection in the angle A I F; and let *a*, *c*, *p*, be the projections of the points A, C, P; also let A *a* E be the projected oblique circle, whose centre is *q*. Now, when the plane of projection becomes the primitive circle, whose pole is I, then is I *p*=tangent of half the angle A I F, or of half the arch A F; and I *q*=tangent of A F, or of the angle F H *a*=A I F.

6. If, through any given point of the primitive circle, an oblique circle be described, then the centres of all other oblique circles passing through that point, will be in a right line drawn through the centre of the first oblique circle at right-angles to a line passing through that centre, the given point, and the centre of the primitive: thus, let G A C E (*fig.* 15.) be the primitive circle, A D E I a great circle described through D, its centre being B. H K is a line drawn through B, perpendicular to a right line C I, passing through D, B, and the centre of the primitive circle. Then the centres of all other great circles, as F D G, passing through D, will fall into the line H K.

7. Equal arches of any two great circles of the sphere, will be intercepted between two other circles drawn on the sphere through the remotest poles of those great circles. For let P B E A (*fig.* 14.) be a sphere, whereon A G B, C F D, are two great circles, whose remotest poles are E, P; and through these poles let the great circle P B E C, and the small circle P G E, be drawn, intersecting the great circles A G B, C F D, in the points B, G, and D, F: then are the intercepted arches B G and D F equal to one another.

8. If lines be drawn from the projected pole of any great circle, cutting the peripheries of the projected circle and plane of projection, the intercepted arches of those circumferences are equal; that is, the arch G B=*f d*.

9. The radius of any small circle, whose plane is perpendicular to that of the primitive circle, is equal to the tangent of that lesser circle's distance from its pole; and the secant of that distance is equal to the distance of the centres of the primitive and lesser circle. For let P (*fig.* 13.) be the pole, and A B the diameter of a lesser circle, its plane being perpendicular to that of the primitive circle, whose centre is C: then *d* being the centre of the projected lesser circle, *d a* is equal to the tangent of the arch P A, and *d* C=secant of P A.

PROJECTURE, in architecture, the out-jetting, prominency, or embossing, which the mouldings, and other members, have beyond the naked wall, column, &c. and is always in proportion to the height.

PROLAPSUS, in surgery, a prolapsion, or falling out of any part of the body from its natural situation: thus, we say, prolapsus intestini, a prolapsion of the intestine, &c.

PROLAPSUS *Ani*, is such a prolapsion of the intestinum rectum, that it is frequently inverted, or prolapsed to such a degree, both in adults and infants, as to appear near a hand-breadth hanging out of its natural situation.

PROLAPSUS *Oculi*, is a distemperature of the eye, in which it is so violently inflamed and swelled, that it cannot be contained in its orbit, but protrudes itself out of its natural seat.

PROLAPSUS *Uteri*, is when the uterus falls down and appears out of the vagina; whereas when it only descends into the vagina, it is termed a descent, or bearing down of the womb.

PROLATE, in geometry, an epithet applied to a spheroid, produced by the revolution of a semi-ellipsis about its larger diameter.

PROLATION, in musick, the art of shaking, or making several inflections of the voice, or sound, on the same note or syllable.

PROLEGOMENA, in philology, certain preparatory observations, or discourses, prefixed to a book, &c. containing something necessary for the reader to be ap-

prised of, to enable him the better to underſtand the book, or to enter deeper into the ſcience, &c.

PROLEPSIS, a figure in rhetorick, by which we anticipate or prevent what might be objected by the adverſary: thus, it may be objected, &c.

PROLEPTICK, an epithet applied to a periodical diſeaſe which anticipates, or whoſe paroxiſm returns ſooner and ſooner every time, as is frequently the caſe in agues.

PROLIFICK, ſomething that has the qualities neceſſary for generating.

PROLIXITY, in diſcourſe, the fault of entering into too minute a detail, of being too long, preciſe, and circumſtantial, even to a degree of tedioufneſs.

PROLOCUTOR *of the Convocation*, the ſpeaker or chairman of that aſſembly.

PROLOGUE, *Prologus*, in dramatick poetry, a diſcourſe addreſſed to the audience before the drama or play begins. The original intention was to advertiſe the audience of the ſubject of the piece, and to prepare them to enter more eaſily into the action, and ſometimes to make an apology for the poet. This laſt article ſeems entirely to have taken poſſeſſion of the prologue in the Britiſh drama.

PROMETHEUS, in the ancient aſtronomy, the name of the conſtellation now called Hercules. See the article HERCULES.

PROMISE, in law, is when, upon any valuable conſideration, one binds himſelf by word of mouth to another, to perform a thing agreed on. It is held upon ſuch a promiſe, that action will lie for breach, which will not if the promiſe be without conſideration, that being a naked bargain, from which no action can ariſe.

PROMONTORY, in geography, a high point of land, or rock, projecting out into the ſea; the extremity of which towards the ſea is called a cape, or head-land.

PROMPTER, in the drama, an officer poſted behind the ſcenes, whoſe buſineſs it is to watch attentively the actors ſpeaking on the ſtage, in order to ſuggeſt and put them forward when at a ſtand, to correct them when amiſs, &c. in their parts.

PRONAS, in the ancient architecture, a porch to a church, palace, or other ſpacious building. See PORCH.

PRONG-HOE, in huſbandry, the name of an inſtrument uſed to hoe or break the ground near and among the roots of plants. It conſiſts of two hooked points, of ſix or ſeven inches length; and when ſtruck into the ground, will ſtir and remove it the ſame depth as the plough does; and thus anſwer both the ends of cutting up the weeds, and opening the land.

The prong-hoe comes into excellent uſe even in the horſe-hoeing huſbandry; and in this the hoe-plough can only come within three or four inches of the rows of the corn, turneps, and the like; but this inſtrument may be uſed afterwards; and with it the land may be raiſed and ſtirred, even to the very ſtalk of the plant.

PRONOUN, *Pronomen*, in grammar, a declineable part of ſpeech, which being put inſtead of a noun, points out ſome perſon or thing.

Pronouns are divided into the ſix following claſſes: demonſtrative pronouns, relative pronouns, poſſeſſive pronouns, gentile pronouns, (or ſuch as denote a perſon's country, as noſtras, veſtras, and cujus) interrogative pronouns, and reciprocal pronouns.

PRONUNCIATION, *Pronunciatio*, in grammar, the manner of articulating or ſounding the words of a language. There is no part ſo defective in grammar as that of the pronunciation, as the writer has frequently no term whereby to give the reader an idea of the ſound he would expreſs: for want of a proper term, therefore, he ſubſtitutes a vicious and precarious one. To give a juſt idea of the pronunciation of a language, it ſeems neceſſary to fix as nearly as poſſible all the ſeveral ſounds employed in the pronunciation of that language.

PRONUNCIATION, is alſo uſed for the fifth and laſt part of rhetorick, which conſiſts in varying and regulating the voice agreeably to the matter and words, ſo as moſt effectually to perſuade and touch the hearers.

It is much the ſame with what is otherwiſe called emphaſis.

PROOF, in arithmetick, an operation whereby the truth and juſtneſs of a calculation is examined and aſcertained. The proper proof is always by the contrary rule: thus ſubtraction is the proof of addition, and multiplication of diviſion; and vice verſa.

PROOF, in law, &c. denotes the mediums or arguments uſed to evince the truth of any thing.

PROOF, is alſo uſed in a ſynonymous ſenſe with ſtandard: thus we call that proof-ſpirit, which is of the ſtandard ſtrength, or half alcohol half phlegm.

PROPAGATION, *Propagatio*, the act of multiplying the kind, or of producing the like in the natural way of generation.

PROPER, *Proprium*, ſomething naturally or eſſentially belonging to any thing.

PROPERTY, *Proprietas*, in a general ſenſe, that which conſtitutes or denominates a thing proper; or it is a particular virtue or quality which nature has beſtowed on ſome things excluſive of all others: thus colour is a property of light; extenſion, figure, diviſibility, and impenetrability, are properties of body, &c.

PROPERTY, in law, is defined to be the higheſt right a perſon has, or can have, to any thing; it being uſed to denote that right which one has to lands or tenements, goods or chattels, in no reſpect depending upon another's courteſy.

PROPHECY, a prediction made by divine inſpiration.

PROPHET, in general, a perſon who foretels future events, but is particularly applied to ſuch inſpired perſons among the Jews as were commiſſioned by God to declare his will and purpoſes to that people. Among the canonical books of the Old Teſtament, we have the writings of 16 prophets, four of which are denominated the greater prophets, viz. Iſaiah, Jeremiah, Ezekiel, and Daniel, ſo called from the length or extent of their writings, which exceed thoſe of the others, viz. Hoſea, Joel, Amos, Obadiah, Jonas, Micah, Nahum, Habakkuk, Haggai, Zachariah, and Malachi, who are called the leſſer prophets from the ſhortneſs of their writings. The Jews do not place Daniel among the prophets, becauſe they ſay he lived the life of a courtier rather than that of a prophet. An account of the ſeveral writings of the prophets may be ſeen each under its particular head.

PROPHYLACTICE, in medicine, that part thereof which inſtructs as to the method of preſerving health and averting diſeaſes.

PROPITIATION, in theology, a ſacrifice offered to God to aſſuage his wrath, and render him propitious. Among the Jews there were both ordinary and publick ſacrifices, as holocauſts, &c. offered by way of thankſgiving; and extraordinary ones, offered by particular perſons guilty of any crime, by way of propitiation.

The Romiſh church believe the maſs to be a ſacrifice of propitiation for the living and the dead. The reformed churches allow of no propitiation but that one offered by Jeſus Chriſt on the croſs.

PROPITIATORY, or MERCY-SEAT, among the Jews, was the cover or lid of the ark of the covenant. See ARK.

PROPOLIS, the name of a certain ſubſtance more glutinous and tenacious than wax, with which the bees ſtop up all the holes or cracks in the ſides of their hives. See APIS.

PROPORTION. When two quantities are compared one with another, in reſpect of their greatneſs or ſmallneſs, the compariſon is called ratio, reaſon, rate, or proportion: but when more than two quantities are compared, then the compariſon is more uſually called the proportion that they have to one another. The words ratio and proportion are frequently uſed promiſcuouſly.

When two quantities only are compared, the former term is called the antecedent, and the latter the conſequent.

The relation of two homogeneous quantities one to another, may be conſidered either, 1. By how much the one exceeds the other, which is called their difference. Thus 5 exceeds 3 by the difference 2. Or, 2. What part or parts one is of another, which is called ratio. Thus the ratio of 6 to 3 is $\frac{6}{3}=\frac{2}{1}$, or double; and the ratio of 3 to 6 is $\frac{3}{6}=\frac{1}{2}$, or ſubduple.

When two differences are equal, the terms that compoſe them are ſaid to be arithmetically proportional. Thus ſuppoſe the terms to be a and b, their difference d. If a be the leaſt term, then $a+d=b$. And if a be the greateſt, then $a-d=b$.

But

But when two ratios are equal, the terms that compofe them are faid to be geometrically proportional. For fuppofe a and b to be the terms of any ratio; if a be the leaft term, put $r=\frac{b}{a}$, then $a\ r=b$ by equal multiplication: but if b be the leaft term, put $r=\frac{a}{b}$ then $b\ r=a$ by equal multiplication, and $\frac{a}{r}=b$ by equal divifion.

Thus the ratio of two quantities, or of two numbers, in geometrical proportion, is found by dividing the antecedent by the confequent, and the quotient is the exponent or denominator of the ratio.

Proportions, fo many of them as are rational, or between number and number, have particular names given them by the Greek and Latin writers. Thus, if after the antecedent be divided by the confequent, the quotient be 1, it is called proportion of equality, or fimple proportion. If the quotient be 2, 3, 4, (or any other integral number) it is called multiple proportion, (viz. double, triple, quadruple, &c.) and the contrary to thofe are called fub-multiple, (viz. fub-duple, fub-triple, fub-quadruple, &c.) or one half, one third, one fourth, or other fuch aliquot part.

If the quotient be 1, with one fuch part, as $1\frac{1}{2}$, $1\frac{1}{3}$, $1\frac{1}{4}$, &c. it is called fuper-particular, (viz. fefquialteral, fefquitertian, fefquiquartan, &c.) and the contraries hereunto are called fub-fuperparticular (viz. fub-fefquialteral, fub-fefquitertian, &c.)

If fuch quotient be 2, 3, 4, (or fuch other integer greater than unity) with fuch an aliquot part it is called multiple-fuperparticular (as $2\frac{1}{2}$ double-fefquialteral, $3\frac{1}{3}$ triple-fefquitertian, $3\frac{1}{4}$ triple-fefquiquartan, &c.) and the contraries thereunto are fub-multiple-fuperparticular, as fub-duple-fefquialteral, fub-triple-fefquitertian, &c.

If the quotient be 1, with fome number of aliquot parts, as $1\frac{2}{3}$, $1\frac{3}{4}$, $1\frac{2}{5}$, &c. it is called fuper-partient, (as fuper-bipartiens tertias, fuper-tripartiens quartas, fuper-bipartiens quintas, &c. (and the contraries hereunto are fub-fuperpartient, as fub-fuperbipartiens tertias, &c.

If fuch quotient be fome greater integer number, (as 2, 3, &c.) with fuch number of aliquot parts, as $2\frac{2}{3}$, $3\frac{3}{4}$, $3\frac{3}{5}$, &c. it is called multiple-fuper-partiens, (as dupla-fuperbipartiens tertias, tripla-fupertripartiens quartas, tripla-fupertripartiens quintas, &c.) And the contraries thereunto, fubmultiple-fuperpartient (as fubdupla-fuperbipartiens tertias, fubtripla-fupertripartiens quartas, &c.) as that of 31 to 7 (becaufe $\frac{31}{7}=4\frac{3}{7}$) is quadruple-fupertripartiens feptimas; and its contrary, 7 to 31, is fubquadruple-fupertripartiens feptimas. And under fome of thefe compellations all proportions will fall, which are as one integer number to another.

But it is much better, and more intelligible, to exprefs thefe proportions, as the ufual manner now is, by the numbers themfelves, than by thefe names, as 31 to 7, or as 7 to 31.

If when four quantities are confidered, you find that the firft hath as much greatnefs or fmallnefs in refpect to the fecond, as the third hath in refpect to the fourth: thofe four quantities are called proportionals.

Proportion confifts of three terms at leaft, whereof the fecond fupplies the place of two.

When three magnitudes, A, B, C, are proportional, the firft A has a duplicate ratio to the third C, of that it hath to the fecond B: but when four magnitudes, A, B, C, D, are proportional, the firft A has a triplicate ratio to the fourth D, of what it has to the fecond B; and fo alfo in order one more, as the proportional fhall be extended.

Duplicate ratio is thus expreffed, $\frac{A}{C}=\frac{A}{B}$ twice; that is, the ratio of A to C is duplicate of the ratio of A to B. For let A=2, B=4, C=8; then the ratio of 2 to 8, is duplicate of the ratio of 2=A to B=4, or as the fquare of 2 to the fquare of 4.

Triplicate ratio is thus expreffed, $\frac{A}{D}=\frac{A}{B}$ thrice; that is, the ratio of A again=2, to D=16, is triplicate of the ratio of A=2, to B=4, or as 8 the cube of 2, to 64 the cube of 4. Wherefore duplicate ratio is the proportion of fquares, and triplicate that of cubes.

And the ratio of 2 to 8, is compounded of the ratio of that of 2 to 4, and of 4 to 8. From what has been faid of the nature of ratio and proportion, the eight ways of arguing, which are often ufed by mathematicians, will evidently follow.

1. Alternate proportion, is the comparing of antecedent to antecedent, and confequent to confequent.

2. Inverfe ratio, is when the confequent is taken as the antecedent, and fo compared to the antecedent, as the confequent.

3. Compound ratio, is when the antecedent and confequent, taken both as one, are compared to the confequent itfelf.

4. Divided ratio, is when the excefs wherein the antecedent exceedeth the confequent, is compared to the confequent.

5. Converfe ratio, is when the antecedent is compared to the excefs wherein the antecedent exceeds the confequent.

6. Proportion of equality, is where there are taken more quantities than two in one order, and alfo as many quantities in another order, comparing two to two being in the fame ratio: it follows, that as in the firft order of quantities, the firft is to the laft, fo in the fecond order of quantities, is the firft to the laft: or otherwife it is comparifon of the extremes together, the mean quantities being omitted.

7. Ordinate proportion is, when antecedent is to confequent, as antecedent is to confequent; and as the confequent is to any other, fo is the confequent to any other.

8. Perturbate proportion, is when three magnitudes being put, and others alfo which are equal to thefe in multitude, as in the firft magnitudes the antecedent is to the confequent, fo in the fecond magnitudes is the antecedent to the confequent: and as in the firft magnitudes the confequent is to any other, fo in the fecond magnitudes is any other to the antecedent.

In the foregoing cafes, the product of the mean is equal to that of the extremes, and therefore the quantities are proportionals. When of feveral quantities the difference or quotient of the firft and fecond is the fame with that of the fecond and third, they are faid to be in a continued arithmetick or geometrick proportion.

Harmonical PROPORTION, is when three terms are fo difpofed, that as the diff. of the firft and fecond: the diff. of the fecond and third : : firft : third; and they are faid to be harmonically proportional.

Thus 10, 15, 30, are harmonically proportional. For as the diff. of 10 and 15, is to the diff. of 15 and 30, fo is 10 to 30. Alfo 12, 6, 4, are harmonically proportional; for 12—6 : 6—4 : : 12 : 4.

PROPORTION is alfo ufed for the relation between unequal things of the fame kind, whereby their feveral parts correfpond to each other with an equal augmentation or diminution.

Thus, in reducing a figure into little, or in enlarging it, care is taken to obferve an equal diminution, or enlargement, through all its parts; fo that if one line, e. gr. be contracted by one-third of its length, all the reft fhall be contracted in the fame proportion.

The making reductions of this kind is the great ufe of the proportional compaffes.

PROPORTION, in architecture, denotes the juft magnitude of the members of each part of a building, and the relation of the feveral parts of the whole, e. gr. of the dimenfions of a column, &c. with regard to the ordonance of the whole building.

One of the greateft differences amongft architects, M. Perrault obferves, is the proportions of the heights of entablatures, with refpect to the thicknefs of the columns, to which they are always to be accommodated.

In effect, there is fcarce any work, either of the ancients or moderns, wherein this proportion is not different; fome entablatures are even nearly twice as high as others: yet, it is certain, this proportion ought, of all others, to be moft regulated; none being of greater importance, as there is none wherein an effect is fooner difcovered, nor any wherein is more fhocking.

PROPORTION, is likewife underftood of the magnitudes of the members of architecture, ftatues, or the like, with regard to the diftance whence they are to be viewed.

PROPORTION, in painting, is the juft magnitude of the feveral members of a figure, groupe, &c. with regard

gard to one another, to the whole figure, the groupe, and the entire piece.

Proportional, a quantity either numeral or lineary, which bears the fame ratio to a third, as the firft does to the fecond.

PROPOSITION, *Propofitio*, in logick, part of an argument wherein fome quality, either negative or pofitive, is attributed to a fubject; or, according to Chauvinus, it is a complete confiftent fentence, indicating or expreffing fomething either true or falfe, without ambiguity; as, *God is juft*.

Proposition, in mathematicks, is either fome truth advanced and fhewn to be fuch by demonftration, or fome operation propofed and its folution fhewn. If the propofition be deduced from feveral theoretical definitions compared together, it is called a theorem; if from a praxis, or feries of operations, it is called a problem.

Proposition, in poetry, the firft part of a poem wherein the author propofes briefly, and in general, what he is to fay in the body of his work. It fhould comprehend only the matter of the poem, that is, the action and the perfons that act. Horace prefcribes modefty and fimplicity in the propofition, and would not have the poet promife too much, nor raife in the reader too great ideas of what he is going to relate.

PROPRETOR, a Roman magiftrate, who, having difcharged the office of pretor at home, was fent into a province to command there with his former pretorial authority. It was alfo an appellation given to thofe who, without having been pretors at Rome, were fent extraordinarily into the provinces to adminifter juftice without the authority of pretors.

PROPRIETOR, or proprietary, he who has the property of any thing.

PROPRIETY, in grammar, is where the direct and immediate fignification of a word agrees to the thing it is applied to; in which fenfe it is ufed in oppofition to figurative, or remote fignification.

PRO RATA, in commerce, a term fometimes ufed by merchants for, "in proportion:" as each perfon muft reap the profit or fuftain the lofs "pro rata to his intereft, that is, in proportion to his ftock."

PROSCRIPTION, *Profcriptio*, a publication made in the name of the chief or leader of a party, whereby he promifes a reward to any one who fhall bring him the head of one of his enemies.

PROSE, *Profa*, the natural language of mankind, loofe and unconfined by poetical meafures, rhymes, &c. in which fenfe it ftands oppofed to verfe.

PROSECUTOR, in law, he that purfues a caufe in another's name.

PROSELYTE, a new convert to fome religion or religious fect.

PROSODY, *Profodia*, that part of grammar which treats of the quantities and accents of fyllables, and the manner of making verfes.

The Englifh profody turns chiefly on two things, numbers and rhyme.

PROSONOMASIA, a figure in rhetorick, whereby allufion is made to the likenefs of a found in feveral names or words.

PROSOPOPEIA, a figure in rhetorick, whereby we raife qualities, or things inanimate, into perfons. This figure is divided into two parts: 1. When good and bad qualities, accidents, and things inanimate, are introduced as living and rational beings; as in the following verfes of Milton:

- - - - - - - Now gentle gales,
Fanning their odoriferous wings, difpenfe
Native perfumes; and whifper whence they ftole
Thofe balmy fpoils. - - - - - - -

The fecond part of this figure is when we give a voice to inanimate things, and make rocks, woods, rivers, buildings, &c. exprefs the paffions of rational creatures; as in the following paffage of facred writ:

Pfalm xcvii. 2. Let the heavens rejoice, and let the earth be glad; let the fea roar, and the fulnefs thereof: let the field be joyful, and all that is therein: then fhall all the trees of the wood rejoice before the Lord, for he comes to judge the earth. He fhall judge the world with righteoufnefs, and the people with his truth.

PROSTATÆ, in anatomy, two white fpongy glands, about the fize of walnuts, fituated at the root of the penis, or juft below the neck of the bladder.

PROSTAPHÆRESIS, in aftronomy, the difference between the true and mean motion, or true and mean place of a planet. It is alfo called equation of the orbit, or of the centre, and fimply equation.

Prostaphæresis, in aftronomy, the difference between the mean and equated anomaly.

PROSTHESIS, in grammar, the prefixing fome letter or fyllable at the beginning of a word, as in gnatus, for natus, &c.

Prosthesis, among furgeons, is the fupplying that which is deficient by the appofition of new matter, as the filling up ulcers, wounds, &c. with new flefh.

PROSTYLE, in antiquity, a range of columns in the front of a temple.

PROSYLLOGISM, in the fchools, fometimes denotes an argument produced to confirm one of the premiffes of a fyllogifm. Others define it an argument compofed of two fyllogifms, fo difpofed, as that the conclufion of the former is the major or minor of the latter: fo that the fecond fyllogifm may be omitted or underftood.

PROTASIS, in the ancient drama, the firft part of a comick or tragick piece, wherein the feveral perfons are fhewn, their characters intimated, and the fubject of the piece propofed and entered upon.

PROTATICUS, in the ancient drama, a perfon who never appeared but in the protafis, or firft part of the play.

PROTECTION, *Protectio*, the fhelter, authority, and aid employed by any one in behalf of the helplefs or unhappy.

Protection, alfo denotes a privilege belonging to ambaffadors, members of parliament, &c. whereby they and their domefticks are fecured from arrefts, &c.

Protection, in law, in the general, denotes that benefit and fecurity which every denizen or alien hath from the laws.

Protection, in a more fpecial fenfe, denotes an exemption given by the king to a perfon, to fecure him againft fuits in law, &c. upon reafonable caufes moving him thereto, and for a limited time.

PROTECTOR, he who fhelters and defends the weak and diftreffed. Every catholick nation, and religious order, has a protector refiding at the court of Rome, who is a cardinal, called the cardinal protector.

Protector, fometimes denotes the regent of a kingdom; which title and quality Cromwell affumed during his ufurpation.

PROTEST, in law, a caution or open affirmation, that a perfon does either not at all, or but conditionally, yield his affent to any act, or the proceeding of a judge, where his jurifdiction is doubtful; or to anfwer upon his oath, further than by law he is bound. Any of the lords in parliament have a right to proteft againft any bill paffed by a majority, and this diffent is entered in form. The commons have no fuch right.

Protest, in commerce, is a fummons made by a notary publick to a merchant, broker, &c. to accept or difcharge a bill of exchange drawn on him, after his having refufed either to accept or pay the fame. It is called a proteft, as containing a proteftation that the party will return the bill, and even take up money at intereft, and charge all cofts, damages, carriage, and recarriage, on the refufer.

There are two kinds of protefts, the one for want of acceptance, and the other for want of payment.

The firft is to be made by the bearer of the bill at the time of prefenting it, in cafe the perfon on whom it is drawn refufe to accept it, either for the time, or the fum expreffed therein. The latter is made as the bill falls due, whether it has been accepted or not.

The bearers of bills of exchange that have been accepted, or which became payable at a certain day, muft have them either paid or protefted within three days after they become due, on the penalty of anfwering for the omiffion: and if the third day happen to be a holy day, the proteft is to be made on the eve thereof.

At Paris and Hamburgh, the proteft is to be made within 10 days: at Venice, where the bills are paid in banco, a proteft, for want of payment, is to be made within fix days, provided the bank be open, otherwife no proteft to be made; and in other bills upon the third day: at

Rome,

Rome, within 15 days: at Amsterdam within five days: at Leghorn, Milan, and Bologna, there is no time fixed. There is no resource against the drawer or indorser, nor any title to be reimbursed till after protesting.

Bills of exchange, according to M. Ricard, drawn from Amsterdam, Antwerp, or Spain, are to be protested, in default of payment, within 14 days after they fall due, else the bearer stands the risque, not the drawer or indorser, in case the party happen to fail after the said 14th day.

PROTESTANT, an appellation first given in Germany to those who adhered to Luther's doctrine, as, in 1529, they protested against a decree of the emperor Charles V. and the diet of Spires, and appealed to a general council. It has since been applied to the Calvinists, and all denominations of the reformed churches.

PROTESTATION, a solemn declaration made by some judiciary act against an oppression, injustice, or against the legality of a sentence, &c. importing, that the party is determined to oppose it at the proper time.

According to justice Walsh, it is a safe-guard to the party that makes it, from being concluded by the act he is about to do; so that issue cannot be joined upon it.

PROTHONOTARY, *Protonotary*, *Prothonotarius*, properly denotes first notary.

With us, prothonotary denotes an officer in the courts of King's-bench and Common-pleas: of which the former has one, and the latter three.

Prothonotary *of the King's-bench*, records all actions civil sued in that court, as the clerk of the crown-office doth all criminal causes.

Prothonotaries *of the Common-pleas*, enter and inroll all declarations, pleadings, assizes, judgments, and actions; they also make out all judicial writs, as the venire facias, after issue joined; habeas corpus for bringing in of the jury; distringas jurator; writs of execution and seizin, of supersedeas, privilege, &c. and they inroll all recognizances acknowledged in that court, all common recoveries; make exemplifications of records, &c.

PROTHYRIS, in the ancient architecture, sometimes denotes a corner of a wall, called anco, and sometimes a cross beam or thwart rafter. Vignola uses it for a particular sort of key of an arch; which, in his Ionick order, consists of a roll of water-leaves, between two reglets and two fillets, crowned with a Dorick cymatium, and resembling a modillon.

PROTHYRUM, a porch at the outer door of a house, or a portal.

PROTO-MARTYR, the first martyr who suffered death, or even underwent cruel tortures, in testimony of the truth.

PROTOPLAST, *Protoplastus*, denotes Adam, who was the first person formed, as the original of the word imports.

PROTOTYPE, the original or model whereby a thing is formed.

PROTRACTING, Protraction, in surveying, is the plotting or laying down the dimensions taken in the field, by means of a protractor, &c.

Protracting *Pin*, an appendage of a mathematical instrument, which is a fine needle fitted into a handle, used to prick off degrees and minutes from the limb of the protractor.

PROTRACTOR, in surgery, an instrument to draw out any thing from a wound or ulcer, like a forceps.

Protractor, an instrument used in surveying, whereby the angles, taken in the field with a theodolite, circumferentor, &c. are laid down on paper.

This protractor consists of a semi-circular limb B A G (*plate* LXVIII. *fig.* 11.) of brass, silver, horn, or the like, divided into 180°, and subtended by a diameter B A; in the middle whereof is a little notch or lip *o*, called the centre of the protractor. On the limb of the protractor are, sometimes, also placed numbers, denoting the angles at the centres of regular polygons; thus, against the number 5, denoting the side of a pentagon, is found 72, the angle at the centre of a pentagon.

Use of the Protractor. 1. To lay down an angle of any given quantity, or number of degrees. Suppose, e. gr. an angle of 50° with the line A *o* B, required on the point *o*. Lay the centre of the protractor on the given point, and the diameter of the protractor on the given line. Make a mark against the given degree 50, on the limb of the protractor; through which, from the given point, draw a line *o p*: this gives the angle required.

2. To find the quantity of a given angle, e. gr. the angle *p o* B. Lay the centre of the protractor on the point of the angle *o*, and the diameter on the line. The degree of the limb cut by the other line *o p*, viz. 50, is the number of degrees of the angle required.

PROTUBERANCE, *Protuberantia*, in anatomy, any eminence, whether natural or preternatural, that projects beyond the rest.

PROVERB, *Proverbium*, is defined, by Camden, a concise, witty, and wise speech, grounded on long experience, and containing, for the most part, some useful caveat, as, a carrion kite will never be a good hawk, &c.

PROVIDENCE, *Providentia*, the direction of the several parts of the universe by a superior intelligent Being.

According to the celebrated Boëthius, *providence* is but another name for *divine wisdom* itself, which stands at the helm of all things, and by which all things are regulated.

The Helvetick confession, concerning divine providence, thus speaks; "Every thing whatever is destined of God to some certain end, or purpose. He it is, who hath ordained, both its commencement, and the means by which the end shall be attained. The Heathens, indeed, attributed things to blind fortune, and to precarious chance: but St. *James* directs us to say, *If the Lord will, we will do this or that.*" So speaks St. *Austin*; "All things whatever, even those things not excepted, which, to us vain mortals, seem to come to pass rashly and without design; do, in reality, accomplish nothing but the command of God: for at his command it is, that they come to pass at all."

The Epicureans deny any divine providence, as thinking it inconsistent with the repose of the divine nature to meddle with human affairs.

Others deny the existence of a providence from the seemingly unjust distribution of good and evil, which appear to fall indiscriminately on the just and the unjust.

Simplicius thus argues for a providence: if God do not look to the affairs of the world, it is either because he cannot or will not: but the first is absurd, since to govern cannot be difficult, where to create was easy: the latter is both absurd and blasphemous.

PROVINCE, *Provincia*, among the Romans, was a country conquered by them, without the bounds of Italy, governed by a lieutenant, and having peculiar privileges.

Province is now chiefly applied to a division of a kingdom, state, &c. comprising several cities, towns, &c. all under the same government, and usually distinguished by the extent either of the civil or ecclesiastical jurisdiction.

The church distinguishes its provinces by archbishopricks; in which sense, England is divided into two provinces, Canterbury and York.

The united provinces are the seven northern provinces of the Low Countries, who, revolting from the Spanish dominion, made a perpetual alliance, offensive and defensive, at Utrecht, anno 1579.

PROVINCIAL, *Provincialis*, something relating to a province.

It also denotes, in Romish countries, a person who has the direction of the several convents of a province.

PROVINE, a branch of a vine laid in the ground to take root and propagate.

PROVISO, in law, a condition inserted in a deed, upon the observance whereof the validity of the deed depends.

PROVOCATIVE, in physick, a medicine which is supposed to strengthen nature, and incite to venery.

PROVOST, *Præpositus*, an officer, whereof there are divers kinds, civil, military, &c.

Provost of a city or town, is the chief municipal magistrate in several trading cities, particularly Edinburgh, Paris, &c. being much the same with mayor in other places.

He presides in city-courts, and, together with the baillies, who are his deputies, he determines in all differences that arise among the citizens.

The provost of Edinburgh, as well as of the other considerable towns in Scotland, has the title of lord; and the former calls yearly conventions of the royal boroughs to Edinburgh by his missives.

Provost *Marshal of an Army*, is an officer appointed to seize and secure deserters, and all other criminals. He is to hinder soldiers from pillaging, to indict offenders and see the sentence passed on them executed. He also regulates the weights and measures, and the price of provisions, &c. in the army. For the discharge of his office, he has a lieutenant, a clerk, and a troop of marshal-men on horseback, as also an executioner.

There is also a provost marshal in the navy, who hath charge over prisoners, &c.

Provost *of the Mint*, a particular judge instituted for the apprehending and prosecuting of false coiners.

Provost, or *Prevôt*, in the king's stables; his office is to attend at court, and hold the king's stirrup when he mounts his horse, &c. There are four provosts of this kind, each of whom attends his turn monthly.

PROW, *Prora*, in navigation, denotes the head or fore-part of a ship, particularly in a galley, being that which is opposite to the poop or stern. In the middle of the prow is the beak that cuts the water, on the top of which is commonly some figure or hieroglyphick. The prow is lower than the poop, and contains fewer decks.

PROXIMITY, *Proximitas*, denotes the relation of nearness, either in respect of place, blood, or alliance.

PROXY, *Procurator*, a person who officiates as a deputy in the room of another.

Proxy, *Procuracy*, among civilians, also denotes a commission given to a proctor by a client, to manage a cause in his behalf.

PRUINA, in physiology, hoar-frost, which is a concretion of the dew made by the violence of the cold.

PRUNELLA, in physick, is sometimes applied to the dryness of the tongue and throat, especially in acute fevers, with a scurf covering the tongue, sometimes whitish, and sometimes blackish. It sometimes denotes the quinsy, and sometimes the aphthæ.

Prunellæ *Sal*, in pharmacy, a preparation of purified salt-petre, called also lapis prunellæ, and crystal mineral. It is done by throwing the 30th part of its weight of flour of brimstone upon the salt-petre, when melted in a crucible over the fire, whereby some of the more volatile parts of the salt-petre are absorbed.

It is given to cool and provoke urine in fevers and quinsies; though some think that salt-petre purified three or four times, would be a better medicine.

PRUNES, *Pruna*, plumbs dried and baked in an oven, or in the sun. The prunes chiefly used among us are black and large, brought from France, especially Bourdeaux. The juice is esteemed laxative.

PRUNIFEROUS *Trees* or *Shrubs*, are those which bear pretty large and soft plumbs, with a stone in the middle.

PRUNING, in gardening, the operation of cutting off the superfluous branches of trees, either to dispose them to bear better, to grow higher, or appear more regular.

Pruning is an annual operation, which is usually made sloping, sometimes stump-wise. Its best season is about the end of February, though it may be begun as soon as the leaves are off in November, and continued till fresh leaves come on in April.

The weaker and more languishing a tree is, the sooner it ought to be pruned; and the more vigorous, the longer may pruning be deferred.

A tree planted the year before, if it have only shot one fine branch from the middle of the stem, it must be cut to that branch, and the branch shortened to four or five eyes.

If the tree produce two fine branches well placed, with weak ones among them, all required is to shorten them equally to the compass of five or six inches in length, in such manner that the two last eyes of the extremes of the branches, thus shortened, look on the right and left, that they may bring forth at least two new ones. If one of the two branches be much lower than the other, or both on one side, only one is to be preserved; the other to be cut off so close, as that it may never produce thick ones in the same place. If a tree have three or four branches, all in the extremity, or a little beneath, they must be all pruned; and if they be equally thick, they are to be used alike: if some be smaller than the rest, they must only be pruned with a prospect of getting a single branch each, namely, on that side which shall be found empty; and so in the larger: if these fine branches shoot a little below the extremity, it is but shortening their stem. On the contrary, if the branches be most of them ill ones, two at least are to be preserved and pruned in the same manner as the two fine ones. Good weak branches are to be preserved for fruit, only cutting them a little at the extremity. If the tree have produced five, six, or seven branches, it is sufficient to preserve three or four of the best.

If a tree having put out two fine wood branches, and one or two small ones, for fruit the first year, the sap have altered its course in the second year, so that the small branches become wood, and the large fruit-branches, the former must be quite cut off to the mother-branch, and the latter used as fruit-branches. If a tree, from the first year's pruning, have produced four or five, &c. branches, these superfluous branches may be left long; but those essential to the beauty of the tree must be all pruned a little longer than those of the preceding year, about two or three eyes, or a good foot. In these vigorous trees, some branches, cut stump-wise, are to be left on, and even some thick ones, though of false wood, especially where there are any necessary to the form of the tree, to employ the excess of sap, and prevent its doing mischief. And it may be necessary, for the same end, to preserve many long, good, weak branches, when placed so as to occasion no confusion, and even on the thick branches, a good number of outlets for the sap to range in. Let it be a general rule to spare the lower branches, and cut off the higher, rather than the contrary.

In a tree that has been planted three years, and pruned twice, if it be vigorous, as many old branches as possible are to be preserved, especially for fruit: if it be weak, it must be eased of the burden of old branches. It must likewise be cut short, to make it shoot out new ones; and if it cannot do this with vigour, let it be pulled up, and a new one, with fresh earth, planted in its place.

General Rules for Pruning *Fruit-trees*. 1. The more the branches shoot horizontally, the better disposed the tree is to bear fruit; and the contrary.

Hence, the middle of a tree is to be kept from wood or thick branches; for there is no danger but the place will be soon filled with more fruitful wood.

In dwarfs prune all open, leaving none but horizontal branches: and in wall-trees, if you do but furnish your walls with horizontal branches, nature will provide for the middle. Chuse, therefore, such shoots as are not vigorous to furnish bearing branches.

2. Take care the tree be not left over full of wood, not even of bearing branches.

3. All strong branches are to be left longer on the same tree than weak ones; consequently, the branches of a sickly tree must be pruned shorter, and fewer in number, than those of a strong tree.

4. All branches, shooting directly forward from trees that grow against a wall, are to be pruned close to the branch whence they spring, &c.

5. When a branch well placed either against a wall, or in a dwarf, has shot some false wood, prune it off within the thickness of a crown-piece, or slopingly; though this is best pinched off in the beginning of summer.

6. Cut off all branches arising from hard knobs, whereon pear-stalks grew; or from short straight branches like spurs.

7. If a tree have produced branches of a moderate vigour, and afterwards puts forth strong ones, well placed, though of false wood; the latter may be used as the foundation of the figure, and the other kept a time for bearing fruit.

8. When an old tree shoots stronger branches towards the bottom than the top, and the top is in ill case, cut it off, and form a new figure from the lower ones. If the top be vigorous, cut off the lower ones, unless well placed.

9. In vigorous trees, the weaker branches are the fruit-bearers; in weak trees, the stronger chiefly: therefore, in the latter, prune off the feeble and small.

10. The pruning of vigorous peach-trees to be deferred till they are ready to blossom, the better to know which are likely to bear fruit.

11. The buds of all stone-fruit frequently form themselves the same year in which the branch they grow on is

is formed; the ſame holds of pears and apples; though it is generally, at leaſt, two or three years before the latter come to perfection.

12. All ſhoots that put forth in autumn are to be pruned off.

13. When a tree puts forth much ſtronger ſhoots on one ſide than the other, a great part of the ſtrong ones muſt be cut off cloſe to the body, or ſome of them ſtump-wiſe.

14. If a young crooked tree produce a fine branch beneath the crook, cut the head off cloſe to the branch.

Grand yearly PRUNINGS. Fruit-branches being of ſhort continuance, and periſhing the firſt year wherein they produce fruit, are to be cut off, unleſs they put forth ſhoots for bloſſoms the ſucceeding year. In the ſecond pruning, about the middle of May, where the fruit is ſo cloſe as to be like to obſtruct each other, ſome of them and their branches are to be taken off, as alſo the multitude of young ſhoots.

PRUNING *of Foreſt or Timber-trees.* For large trees it is beſt not to prune them at all; yet, if there be an abſolute neceſſity, avoid taking off large boughs as much as poſſible. And, 1. If the bough be ſmall, cut it ſmooth, cloſe, and ſloping. 2. If the branches be large, and the tree old, cut it off at three or four feet from the ſtem. 3. If the tree grow crooked, cut it off at the crook ſloping upwards, and nurſe up one of the moſt promiſing ſhoots for a new ſtem. 4. If the tree grow top-heavy, its head muſt be lightened, and that by thinning the boughs that grow out of the main branches. But if you would have them ſpring, rub off the buds, and ſhrowd up the ſide-ſhoots. 5. If the ſide-boughs ſtill break out, and the top be able to ſuſtain itſelf, give the boughs that put forth in ſpring a pruning after midſummer, cutting them cloſe.

PRUSSIAN BLUE, among painters, &c. is prepared by precipitating a ſolution of green vitriol and alum with a lixivium drawn from fixed alkaline ſalt that has been calcined with animal coals. Commonly about three parts of alkali and two of dried ox-blood are calcined ſo long as any flame appears, then thrown into boiling water, and the ſtrained decoction poured into a hot mixture of ſolutions of four parts alum, and one or leſs of vitriol. The liquor becomes inſtantly thick or curdly, and looks at firſt of a greyiſh colour, which changes to a brown, and in a little time to a blueiſh green. The matter being well ſtirred together, and mixed with a quantity of hard ſpring water, a green precipitate ſubſides: ſpirit of ſalt poured upon the edulcorated powder, diſſolves a part, and turns the reſt of a fine blue colour.

PSALM, a divine ſong or hymn; but chiefly appropriated to the 150 pſalms of David, a canonical book of the Old Teſtament,

The divine authority of this book of Pſalms is ſo certain and evident, that it was never queſtioned in the church: which being fixed, it is of ſmall moment that the penmen of ſome of them are not known: nor doth this any more leſſen its authority, than it invalidates the decree of a prince, or an act of parliament, that it is not certain by whoſe pen it was drawn up. Moſt of them were compoſed by David, as is evident from the title of them, and from the expreſs teſtimony of the New Teſtament concerning ſome of them; and that they were all written by the inſpiration of God's Spirit appears both from the divine matter and frame of them, and from II. Sam. xxiii. 1. Matt. xxii. 43, &c. Acts i. 16. and ii. 25. It is apparent that the Pſalms were not written in the order in which they now lie, but they were put into this order either by *Ezra*, as the Hebrew doctors affirm, or by ſome other holy prophet or prophets. It is ſufficient for us, that the whole book is owned as canonical by our bleſſed Saviour, Luke xxiv. 44. And concerning which, the learned and ingenious Mr. Romaine thus writes:

"The book of Pſalms is a treaſury of divine knowledge. It contains a complete collection of ſacred hymns, which were compoſed in praiſe of the bleſſed JESUS—whoſe miraculous birth—whoſe life and actions—ſufferings and death—reſurrection and aſcenſion—and inveſtiture and ſupreme power on the throne of glory—his gathering the church out of all lands—and protecting it to the end of the world, againſt its enemies—and then putting it in poſſeſſion of eternal glory—are the ſubjects here treated of. And they are the moſt noble and elevated ſubjects in themſelves, and beſides they are the moſt intereſting to every believer. Every part of them is full of wonder and miracle, which deſerve his greater attention and eſteem, becauſe each of them was done for his ſalvation. And the author, who undertook to write upon theſe ſubjects, has not fallen below their dignity; he has recommended them to us by all the graces of language, and the ſublimity of ſentiment. His poetry is worthy of himſelf, and riſes up to the merits of that adorable Perſon whom it celebrates: for it came from heaven. The Pſalms were not the compoſition of king *David*, or the flights of his poetical imagination; he was only the ſcribe, who copied them from the dictates of the all-wiſe Spirit: they are indeed the inſpiration of the Almighty, whoſe the matter is, and from whom the words themſelves proceeded. And if any perſons doubt of it, let them take any one deſcription of nature out of the Pſalms, and compare it with what the beſt heathen authors have ſaid upon the ſame ſubject, and they will ſee reaſon enough to be abaſhed and confounded at the abject poverty of the human genius, when put into competition with the infinite perfection of the inſpired volume." *Practical Comment on the 107th Pſalm,* page 33—35.

PSALMODY, the art or act of ſinging pſalms.

PSALTER, the ſame with the book of Pſalms.

PSALTERY, a muſical inſtrument, much in uſe among the ancient Hebrews, who called it nebel, or nabal.

PSIDIUM, the guava, in botany, a genus of plants, whoſe flower conſiſts of five ovate, concave patent petals, inſerted in a campanulated cup; the filaments are numerous, ſhorter than the petals, and topped with ſmall antheræ; the fruit is a very large oval berry, crowned with the cup, and contains one cell, which includes a great number of ſmall ſeeds.

This genus grows in both Indies, the fruit of which is much eaten by the inhabitants of thoſe parts: it is very aſtringent, and nearly of the ſame quality with the pomegranate, ſo ſhould be avoided by thoſe perſons who are ſubject to be coſtive.

PSOAS, in anatomy, the name of two muſcles, diſtinguiſhed by the epithets magnus and parvus. The pſoas magnus is one of the flexor muſcles of the thigh, and ariſes from the firſt, ſecond, third, and fourth vertebræ of the loins. The pſoas parvus is one of the flexor muſcles of the loins, which ariſes by a ſlender tendon from the os pubis, where it is joined to the illium; and is inſerted into the ſide of the upper vertebræ of the loins; it is often wanting, and when found, its office is to aſſiſt the quadratus in elevating the oſſa innominata, eſpecially when we lie down.

PSYCHROMETER, an inſtrument for meaſuring the degrees of coldneſs or heat in the air, and more uſually called thermometer. See THERMOMETER.

PSYLLIUM, flea-wort, in botany, is comprehended by Linnæus among the plantains. See PLANTAIN.

The ſeeds of pſyllium are recommended in the dyſentery and corroſion of the inteſtines. See DYSENTERY.

PTEROPHORI, in antiquity, were ſuch Roman couriers as brought tidings of a declaration of war, loſs of a battle, or any miſhap befallen the Roman army.

PTERYGIUM, in medicine, is a film on the eye called unguis, or pannus, a nail or web.

In Celſus it denotes a diſorder in the fingers, or whitloe, when ſeated at the root of the nail.

PTERYGOIDES, or *Proceſſus Pterygoides*, in anatomy, the pterygoid or wing-like proceſſes of the os ſphenoides. See CAPUT.

PTERYGOIDEUS *Internus*, in anatomy, is a muſcle of the jaw, ariſing from the internal part of the pterygoid proceſs that draws it to one ſide.

PTERYGOIDEUS *Externus*, in anatomy, another muſcle of the jaw, ariſing from the external part of the ſame proceſs, that pulls the lower jaw forwards, and makes it ſhoot beyond the upper.

PTERYGOPALATINUS MUSCULUS, in anatomy, a muſcle of the uvula.

PTERYGOPHARYNGÆUS MUSCULUS, in anatomy, a muſcle of the fauces.

PTERYGOSTAPHYLINUS, in anatomy, is a muſcle of the uvula, of which there are ſeveral.

PTISAN, *Ptiſana*, or *Ptiſſana*, in medicine, is a cooling

ing potion, commonly made of barley decorticated, boiled in water, and ſweetened with liquorice, &c.

Sometimes there are added laxative herbs, as ſena, &c.

PTOLEMAICK SYSTEM, or hypotheſis, that ſyſtem wherein the earth is ſuppoſed to be at reſt in the centre, and the heavens to revolve round it from eaſt to weſt, carrying with them the ſun, planets, and fixed ſtars in their reſpective ſpheres.

This hypotheſis took its name from Ptolemy, the great Alexandrian aſtronomer, as illuſtrated by him; it had been held before by Ariſtotle, Hipparchus, &c. See SYSTEM.

PTYALISM, *Ptyaliſmus*, in phyſick, a frequent and copious diſcharge of ſaliva. Among the moderns, it generally denotes a ſalivation excited by mercury.

PUBERTY, the age wherein a perſon is capable of procreation, or begetting children.

Boys arrive at puberty at 14 years of age, and girls at 12: 18 years of age is accounted full puberty.

PUBES, among anatomiſts, &c. denotes the middle part of the hypogaſtrick region of the abdomen, lying between the two inguina, or groins. See ABDOMEN.

PUBLICAN, *Publicanus*, among the Romans, one who farmed the taxes and publick revenues.

PUBLICATION, *Publicatio*, the act of making a thing known to the world; the ſame with promulgation.

PUCELLAGE, *Pucellagium*, or *Puellagium*, denotes the ſtate of virginity. See VIRGINITY.

PUCERON, *Podura*, in zoology, a genus of wingleſs inſects, with fewer than ſix pair of legs. The body is ſhort and roundiſh; the tail is crooked and forked; the legs are three pair, and ſerve only for walking; and the eyes are two, but each compoſed of eight leſſer ones.

PUDDINGS, in a ſhip, are ropes nailed to the arms of the main and fore-yards, near the ends, and then at three or four due diſtances inwards one from another, in order to keep the robbins from galling or wearing aſunder upon the yards, when the top-ſail ſheets are haled home.

They call alſo thoſe ropes which are wound round the rings of anchors, to ſave the clinch of the cable from being galled with the iron, by this name; ſo that when the ring is ſo ſerved, it is called the pudding of the anchor.

PUDENDA, the parts of generation in both ſexes. See GENERATION.

PUGIL, *Pugillus*, in phyſick, &c. ſuch a quantity of flowers, ſeeds, or the like, as may be taken up between the thumb and two fore-fingers. It is eſteemed to be the eighth part of the manipule or handful.

PUISNE, or PUNY, in law, one younger born. It is not only applied to the ſecond, third, fourth, &c. child, with regard to the firſt-born; but to the third with regard to the ſecond, &c. The laſt of all is called cadet. It is alſo applied to a judge, or counſellor, who is in ſome reſpect inferior to another.

PULLEY, *Trochlea*, in mechanicks, one of the mechanical powers, called by ſeamen a tackle. See TACKLE and POWER.

When a little wheel, commonly called a ſheave, or ſheever, is ſo fixed in a box or block, as to be moveable round a centre-pin paſſing through it, ſuch an inſtrument is called a pulley. (See *plate* LXVII. *fig.* 1.) And ſometimes, though improperly, a box or block with ſeveral ſheevers in it, is alſo called a pulley, as that repreſented (*fig.* 2.) The firſt of theſe is, by workmen, called a ſnatch-block.

A rope going round one or more pullies, in order to raiſe a weight, is called the running-rope; and when a block and its ſheevers is ſo fixed, that whilſt it remains immoveable, another block and ſheevers riſes, with a weight hanging at it, ſuch a machine is called a pair of blocks.

If ADBE (*fig.* 3.) be a pulley, upon which hang the weights P, W; then, ſince the neareſt diſtances of the ſtrings AP, and BW, from the centre of motion C, are AC and BC, the pulley will be reduced to the lever or balance, AB, with reſuect to its power; and from thence it appears, that ſince $AC=BC$, we ſhall always have $P=W$, for an equilibrium; and, therefore, no advantage in raiſing a weight, &c. can be had from a ſingle pulley.

In a combination of two pullies, AB, and DFEG, (*fig.* 4.) the power is doubled; for the pulley DFEG is reducible to the lever ED, which muſt be conſidered as fixed in the point E, to the immoveable ſtring HE; and the power acting at D is equal to P; and the weight W is ſuſtained from the centre C of the pulley; but $P:W::CE:DE$; therefore, ſince $DE=2\,CE$, it is $W=2P$, or $P=\frac{1}{2}W$.

From what has been ſaid, we may deduce the following rule, to know the advantage to be gained by a pair of blocks, let their number of pullies and ſheevers be what they will, viz. as 1 is to the number of ropes, or of the parts of the rope, applied to the lower pullies, ſo is the weight to the power.

Thus, it is evident, that in (*fig.* 5.) one pound ſuſtains only a weight of one pound; in (*fig.* 6.) one pound ſuſtains a weight of two pounds; in (*fig.* 9.) a weight of five pounds; and in (*fig.* 10.) one pound raiſes four and ſix pounds. However, it ought to be obſerved, that the above rule is only applicable where the lower pullies riſe altogether in one block, along with the weight; for when they act upon one another, and the weight is only faſtened to the lowermoſt, the force of the power is doubled by each pulley: thus, in (*fig.* 11.) a power equal to one pound will ſuſtain 16 pounds, by means of four pullies; becauſe $1+2+2+2+2=16$.

Again, in the combination of pullies (repreſented in *fig.* 7.) if the power at A be 1, that at B is 3, and at D, 27. And with the combination (*fig.* 8.) which conſiſts of 20 ſheevers, five on each pin, one man may raiſe a ton weight.

The force of the pullies may alſo be eaſily ſhewn by comparing the velocities of the power and weight; for it is evident, if the weight W (*fig.* 6.) be raiſed one inch, each ſtring HE, DB, will be ſhortened one inch, and conſequently the ſtring AP, will be lengthened two inches; and ſo P will paſs through twice the ſpace that W does, in the ſame time: conſequently the tackle of pullies, in the form of (*fig.* 9.) will increaſe the power five times; and that of (*fig.* 10. and 11.) will increaſe it ſix times.

In the diſpoſition of pullies according to (*ug.* 12.) it is plain, ſince each pulley has a fixed rope, it muſt be conſidered as a lever of the ſecond ſort, and ſo will double the power of the foregoing pulley; and ſo four pullies will increaſe the power 16 times.

Though the laſt-mentioned form be of the greateſt force from the ſame number of pullies, yet, if we conſider the ſimplicity, force, and conveniency of the tackle of pullies altogether, none is ſuperior to that where the uppermoſt pulley is fixed, and each has a rope annexed to the weight.

PULMONARIA, lung-wort, in botany, a genus of plants, whoſe flower is monopetalous and funnel-ſhaped.

The common ſpotted lung-wort grows naturally in woods and ſhady places in Italy and Germany, and is cultivated with us for medicinal uſe: it has a glutinous juice which helps it to conſolidate and heal ulcerations and eroſions which proceed from acrimony; it is commended in coughs and conſumptions, ſpitting of blood, and the like diſorders of the lungs.

PULMONARY VESSELS, in anatomy, are arteries and veins which carry the blood from the heart to the lungs, and back again from the lungs to the heart.

PULMONARY *Conſumption.* See CONSUMPTION.

PULP, in pharmacy, the fleſhy and ſucculent part of fruits, extracted by infuſion or boiling, and paſſed through a ſieve.

PULPIT, *Pulpitum*, an elevated place in a church, whence ſermons are delivered: the French give the ſame name to a reading-deſk.

PULSATILLA, the paſque-flower, in botany. The pulſatilla is cultivated in gardens for the ſake of the flower; and is propagated by ſowing the ſeeds in July. It is ſaid to be vulnerary; and the powder of the dried leaves and flowers is a powerful ſternutatory, but it leaves a burning heat behind it that reaches as far as the brain; for this reaſon it is accounted good in ſleepy diſorders. This genus is comprehended among the anemonies by Linnæus.

PULSE, *Pulſus*, in the animal œconomy, denotes the beating or throbbing of the heart and arteries. See HEART and ARTERY.

No doctrine has been involved in more difficulties than that of pulſes; ſince, in giving a phyſiological account of them, phyſicians have eſpouſed quite oppoſite ſentiments; whilſt

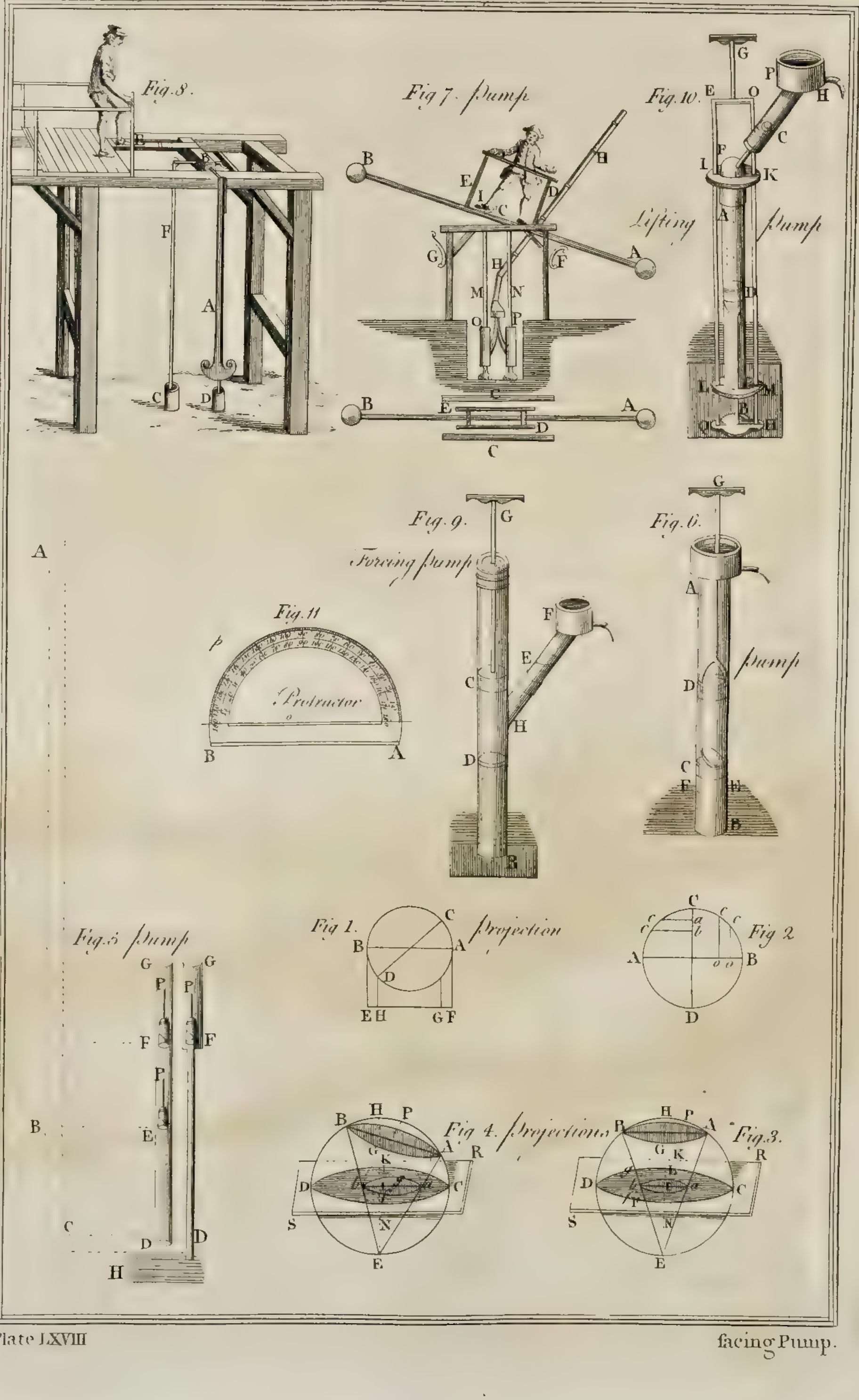


Fig. 8.
Fig 7. Pump
Fig. 10.
Lifting Pump
Fig. 9.
Forcing Pump
Fig. 6.
Pump
Fig. 11
Protractor
Fig. 5 Pump
Fig 1.
Projection
Fig 2
Fig 4. Projections
Fig. 3.

whilst some doubt whether the pulse is owing to the systole or diastole; as also, whether the motion of the heart and arteries is one and the same, for a moment of time. See SYSTOLE and DIASTOLE.

PULSE is also used for the stroke with which any medium is affected by the motion of light, sound, &c. through it. See MEDIUM, LIGHT, &c.

Sir Isaac Newton demonstrates, that the velocity of the pulses is an elastick fluid medium (whose elasticity is proportionable to its density) are in a ratio compounded of half the ratio of the elastick force directly, and half the ratio of the density inversely; so that in a medium whose elasticity is equal to its density, all pulses will be equally swift.

PULSE, *Legumen*, in botany, a term applied to all those grains or seeds which are gathered with the hand, in contradistinction to corn, &c. which are reaped, or mowed: or it is the seed of the leguminous kind of plants, as beans, vetches, &c. but is by some used for artichokes, asparagus, &c.

PULSION, the act of driving or impelling a thing forwards.

PULVERIZATION, *Pulverizatio*, the art of pulverizing, or reducing a dry body into fine powder; which is performed in friable bodies, by pounding or beating them in a mortar, &c. but to pulverize malleable ones, other methods must be taken. To pulverize lead, or tin, the method is this: rub a round wooden box all over the inside with chalk; pour a little of the melted metal nimbly into the box; when, shutting the lid, and shaking the box briskly, the metal will be reduced to a powder. See GRANULATION.

PULVINATED, in the ancient architecture, a term applied to a frize which swells or bulges out in the manner of a pillow.

PULVIS, a powder.

The operation of reducing medicines into powder is so very simple in itself, that it requires no other skill than having those things which come under its management sufficiently dry, in order to be so divided. In judging of the fitness of materials for this treatment, only these two points necessarily require our consideration. The first is, whether the things themselves are thus reducible without any previous management that may hurt their medical virtues? and next, whether their virtues are conveniently preserved in this form when reduced to it? Under the first of these it naturally occurs, that viscid and oily substances cannot be thus managed without first reducing them to some brittleness, which cannot be done without drying; if such things, therefore, cannot be sufficiently dried for triture, without exhaling their better parts, or destroying that particular quality for which the simple is valued in medicine, as it happens with many seeds and gums, they are much better in any other form than this. The other requisite in this form, relating to the preservation of things reduced into it, directs not to prescribe materials therein which are volatile, or will any other way change in the open air. The preparations, intentions, &c. of the several powders used in medicine, may be seen under their several heads. See POWDER.

PULVIS *Fulminans*, among chymists, a powder so called from its smart and loud explosion, when it begins to melt after being placed upon an iron plate over a gentle fire. It is prepared thus; take three ounces of purified nitre, and one ounce of brimstone, and grind them well together in a mortar; then putting a small quantity, as about half a dram, over the fire, in the manner already mentioned, it will make a great explosion. The more philosophical way of accounting for this effect of the pulvis fulminans is, according to Dr. Shaw, by supposing that the acid spirits of the nitre and sulphur being loosened by the heat, rush towards one another, and towards the salt of tartar, with so great a violence, as by the shock at once to turn the whole into vapour and smoke.

PUMICE, in natural history, a slag or cinder of some fossil, originally bearing another form, and only reduced to this state by the action of the fire, though generally ranked by authors among the native stones. It is a lax and spongy matter, frequently of an obscure, striated texture in many parts, and always very cavernous and full of holes; it is hard and harsh to the touch, but much lighter than any other body that comes under the class of stones. It is found in masses of different sizes, and of a perfectly irregular shape, from the bigness of a pigeon's egg to that of a bushel. We have it from many parts of the world, but particularly from about the burning mountains, Ætna, Vesuvius, and Hecla, by whose eruptions it is thrown up in vast abundance; and being by its lightness supported in the air, is carried into seas at some distance by the winds, and thence to distant shores. The great use of pumice, among the antients, seems to have been as a dentifirce, and at present it is retained in the shops on the same account.

PUMMEL. See POMMEL.

PUMP, *Antlia*, in hydraulicks, a machine formed on the model of a syringe, for raising water. See SYRINGE.

The theory of pump-work depends, in a great measure, upon the properties of the inverted syphon: thus, let ABCDEFG (*plate* LXVIII. *fig.* 5.) represent an inverted syphon, ABCD a column of air, and DG the lower part of the pipe of a pump, immersed in the water of the well H. Let P be the piston of the pump at E in its lowest situation, and at F in its highest. Now, as both these parts communicate with the water, one by pressing on it, the other by opening into it, they may be looked upon as communicating with one another.

Wherefore, ABCD (the column of air) would by its weight or pressure force up a column of water into the pipe DG to the height of thirty-two feet, were the air exhausted from the said pipe, and continued to that height; since the weight of a column of air is equal to that of such a column of water of the same base. If, therefore, the piston P be thus thrust down to E, meeting the water there, and from thence it be raised to F with an uniform motion, the water will rise from E to follow the piston with a variable motion.

If in lifting up the piston, the velocity of the water be less than that of the piston, it will not be able to follow it; but will leave a space between them, which will increase more and more as the velocity of the water becomes less than that of the piston. The consequence of this will be, that a part of the stroke of the piston will be lost; and not only that, but the piston, when the water leaves it, will rise very hard, as having a weight of water upon it, and the air of greater density above than below; whence the equilibrium, which ought to be in pumps, is destroyed, and the balance against the workman.

Now as this can happen even where the diameter of the sucking-pipe is equal to that of the pump-barrel, it must happen much sooner when the sucking-pipe is less than the barrel; because the water rising through a less passage, will be longer in filling the pump-barrel, and consequently must quit the piston, and leave the greater void space between. On the contrary, if the least velocity of the water, rising into the pipe, be greater than that of the piston, there will be no void space; and the pump-barrel may be made in proportion as much wider than the sucking-pipe, as the velocity of the water is greater than that of the piston.

Kinds and Structure of PUMPS. Pumps are distinguished into several kinds, according to the different manners of their acting; as the common sucking-pump, forcing-pump, lifting-pump, &c.

1. The structure and action of the common sucking-pump, as it is called, has been so far described in the above theory of pumps, that little remains to be said on it. However, it may not be improper to give a figure or two of this kind of pump, in order to shew its structure, and the contrivances used in working it. (*Plate* LXVIII. *fig.* 6.) represents a simple sucking-pump, in which A is the cistern; AB, the barrel or pipe, standing in the water EF; GD, the piston and bucket, with its bucket and valve D; and C, the valve open for the ascent of the water. (*Fig.* 7.) is a very simple and useful contrivance for working two pumps by means of the balance AB, having large iron balls at each end, placed in equilibre on the two spindles C, as represented in the figure; on the right and left are two boards, I, nailed to two cross pieces fastened to the axis of the machine. On these two boards, the person who is to work the pumps, stands, and supports himself by four posts, E, D, erected perpendicularly, and having cross-pieces on the top. At the distance of ten inches on each side of the axis, are

fastened the pistons M N, which go to the suckers. The man, by leaning alternately on his right and left foot, puts the balance in motion, by which means the pumps O, P, are worked, and the water thrown into the pipe H, and carried to a height proportional to the diameter of the valves, and the action of the balance. It will be necessary to place on each side an iron spring, as F, G, in order to return the balance and prevent its motion from being too great. (*Fig.* 8.) is another machine for working two pumps, where A represents a large weight fastened to the axis, to regulate the motion of the machine. On each side of the axis B, is a piston which goes to the suckers of the two pumps C, D. The machine is put in motion by the man's treading on the board E, and, consequently, the two pumps deliver water alternately. All which is so plain from the figure, that it needs no further description.

2. The forcing-pump, of the common sort, is a machine thus constructed: A B (*fig.* 9) is the barrel standing in the well or mine at B; G C is the piston; and C a solid piece without any hole or valve, because no water is to pass through it, as in the other. This piece should be well leathered, to fit the barrel very nicely, that in its motion neither air nor water should pass between. At a distance below, a valve, with its diaphragm, is fixed to the barrel, as at D. Between this and the lowest situation of the piston C, there goes off a pipe at H, in which there is fixed a diaphragm and valve as at E. Now the piston, being drawn up from C towards A, attenuates the air above D, by which means the water rushes into the space C D; then, when the piston is forced down, as the water cannot repass at C, it is forced to ascend into the pipe at H, and through its valve E into the cistern F, which may be situated at any distance above the pump, from whence the water will run off by the spout.

3. The lifting-pump is only a forcing pump of another structure, represented in (*fig.* 10.) where A B is a barrel fixed in the frame K I L M; which is also fixed immoveable, with the lower part in the water to be exhausted. G E Q H O is a frame with two strong iron rods, moveable through holes in the upper and lower parts of the pump I K, and L M; in the bottom of this frame is fixed an inverted piston B D, with its bucket and valve upon the top at D. Upon the top of the barrel, there goes off a part K H, either fixed to the barrel or moveable by a ball and socket, (as here represented at F) but in either case so very nice and tight, that no water or air can possibly get into the barrel, which would spoil the effect of the pump. In this part, at C, is fixed a valve opening upwards. Now when the piston-frame is thrust down into the water, the piston D descends, and the water below will rush up through the valve D, and get above the piston; where, upon the frame's being lifted up, the piston will force the water through the valve C up into the cistern P, there to run off by the spout. Note, this sort of pump is set so far in the water, that the piston may play below the surface of it.

Air Pump. See Air *Pump*.

PUN, a play of words, the wit whereof depends upon a resemblance between the sounds or syllables of two words, which have different, perhaps contrary meanings.

Cicero has sprinkled several of his works with puns; and in his book, where he lays down the rules of oratory, quotes abundance of sayings, which he calls pieces of wit, that upon examination, prove perfect puns.

PUNCH, an instrument of iron or steel, used in several arts, for the piercing or stamping holes in plates of metal, &c. being so contrived as not only to perforate, but to cut out and take away the piece.

PUNCHEON, Punchin, or Punchion, a little block or piece of steel, on one end whereof is some figure, letter, or mark, engraven either in creux or relievo, impressions whereof are taken on metal, or some other matter, by striking it with a hammer on the end not engraved. There are various kinds of these puncheons used in the mechanical arts; such, for instance, are those of the goldsmiths, cutlers, pewterers, &c.

Puncheon, is also used for several iron-tools of various sizes and figures, used by the engravers in creux on metals. Seal-gravers particularly use a great number for the several pieces of arms, &c. to be engraven, and many stamp the whole seal from a single puncheon.

Puncheon, is also a common name for all those iron instruments used by stone-cutters, sculptors, blacksmiths, &c. for the cutting, inciding, or piercing their several matters.

Puncheon, in carpentry, is a piece of timber placed upright between two posts, whose bearing is too great, serving, together with them, to sustain some large weights.

Puncheon, is also used for the arbour, or principal part of a machine, whereon it turns vertically, as that of a crane, &c.

Puncheon, is also a measure for liquids, containing an hogshead and one third, or 84 gallons.

PUNCTATED Hyperbola, an hyperbola whose oval conjugate is infinitely small, i. e. a point.

PUNCTUATION, in grammar, the art of pointing or of dividing a discourse into periods, by points, expressing the pauses to be made in the reading thereof. See Point.

PUNCTUM, in geometry, &c. See Point.

Punctum Saliens, in anatomy, the first rudiments of the heart in the formation of the fœtus, where a throbbing motion is perceived. This is said to be easily observed with a microscope in a brood egg, wherein, after conception, we see a little speck or cloud, in the middle whereof is a spot that appears to beat or leap a considerable time before the fœtus is formed for hatching. See Foetus.

PUNCTURE, in surgery, any wound made by a sharp-pointed instrument.

PUNICA, the *Pomegranate-Tree*, in botany. See the article Pomegranate.

PUNISHMENT, in law, the penalty which a person incurs on the breach or transgression of any law.

PUNITORY Interest, in the civil law, such interest of money as is due for the daily payment, breach of promise, &c.

PUPIL, *Pupillus*, in the civil law, a boy or girl not yet arrived at the age of puberty, i. e. the boy under 14 years, the girl under 12.

Pupil is also used in universities, &c. for a youth under the education or discipline of any person.

Pupil, *Pupilla*, in anatomy, a little aperture in the middle of the uvea and iris of the eye, through which the rays of light pass to the crystalline, in order to be painted on the retina, and cause vision.

The structure of the uvea and iris, is such as that by their aperture the pupil is contractible and dilatible at pleasure, so as to accommodate itself to objects, and to admit more or fewer rays; as the object, being either more vivid and near, or more obscure and remote, requires more or less light: it being a constant law, that the more luminous the object is, the smaller the pupil; and again, the nearer the object, the smaller the pupil; and vice versa. This alteration of the pupil is effected by certain muscular fibres on the outside of the uvea, which arrive from the nerves detached hither from the sclerotica: some others attribute the motions of the pupil to the ligamentum ciliare; and others think that both this and the fibres of the uvea concur herein.

There is a disease of the eye called a contraction of the pupil, wherein there is such a total or close contraction of that part, that it will not transmit light enough to the bottom of the eye, to enable the patient to see objects distinct; sometimes this disorder is from infancy, and sometimes it arises from an intense inflammation of the eye. The cure of this is extremely difficult; but Mr. Cheselden has invented a method by which he has often proved very succesful in his attempts to relieve it. The method is this: the eye-lids being held open by a speculum oculi, he takes a narrow single edged scalpel, or needle, almost like that used in couching for the cataract, and passing it through the sclerotica, as in couching, he afterwards thrusts it forward through the uvea or iris, and in extracting cuts it open through the iris. See Couching.

PURCHASE, in law, the buying or acquiring of lands, &c. with money, by deed or agreement, and not by descent or right of inheritance.

Purchase, in the sea-language, is the same as drawn in; thus when they say the capstan purchases apace, they only mean it draws in the cable a-pace.

PURE, something free from any admixture of foreign

or heterogeneous matters: thus we ſay pure fire, &c. See FIRE, &c.

PURE HYPERBOLA, in conicks, is an hyperbola without any oval, nodes, ſpike, or conjugate point.

PURFLEW, a term in heraldry, expreſſing ermins, peans, or any of the furs, when they compoſe a bordure round a coat of arms: thus they ſay, he beareth gules a bordure, purflew, vairy: meaning that the bordure is vairy.

PURGATION, the art of purging, ſcouring, or purifying a thing, by ſeparating or carrying off any impurities found therein.

PURGATIVE, or *Purging Medicines*, a medicament which evacuates the impurities of the body by ſtool, called alſo cathartics.

PURGATORY, a place in which the juſt, who depart out of this life, are ſuppoſed to expiate certain offences which do not merit eternal damnation.

Broughton has endeavoured to prove, that this notion has been held by Pagans, Jews, and Mahometans, as well as Chriſtians. The doctrine of purgatory is a very lucrative article to the clergy of the Romiſh church, who are very liberally paid for maſſes and prayers for the ſouls of the deceaſed. We are told by ſome of their doctors, that purgatory is a ſubterraneous place, ſituated over the hell of the damned, where ſuch ſouls as have not yet made ſatisfaction to divine juſtice for their ſins, are purged by fire, after a wonderful and incomprehenſible manner: and here they are purified from thoſe dregs which hinder them from entering into their eternal country, as the catechiſm of the council of Trent expreſſes it.

PURGE, in medicine, the ſame with cathartick. See CATHARTICKS.

PURIFICATION, in matters of religion, a ceremony which conſiſts in cleanſing any thing from a ſuppoſed pollution or defilement.

The Pagans, before they ſacrificed, uſually bathed or waſhed themſelves in water, and they were particularly careful to waſh their hands, becauſe with theſe they were to touch the victims conſecrated to the gods. It was alſo cuſtomary to waſh the veſſel with which they made their libations. The Mahometans uſe purifications as previous to the duty of prayer; theſe alſo are of two kinds, either bathing, or only waſhing the face, hands and feet. The firſt is requeſted only in extraordinary caſes, as after having lain with a woman, touched a dead body, &c. But leſt ſo neceſſary a preparation for their devotions ſhould be omitted, either where water cannot be had, or when it may be of prejudice to a perſon's health, they are allowed in ſuch caſes to make uſe of fine ſand or duſt inſtead of it; and then they perform this duty by clapping their open hands on the ſand, and paſſing them over the parts, in the ſame manner as if they were dipped in water.

There were alſo many legal purifications among the Hebrews. When a woman was brought to bed of a male child, ſhe was eſteemed impure for 40 days; and when of a female, for 60; at the end of which time ſhe carried a lamb to the door of the temple, to be offered for a burnt-offering, and a young pigeon or turtle for a ſin-offering, and by this ceremony ſhe was cleanſed or purified.

Among the Romaniſts, the holy water is uſed by way of purification.

PURIFICATION *of the bleſſed Virgin*, a feſtival of the Chriſtian church, obſerved on the ſecond of February, in memory of the offering up of our Saviour in the temple, and his mother's ſubmitting to the Jewiſh law of purification after the birth of a male child.

PURIFICATION, in chymiſtry, the act of purifying or refining natural bodies by ſeparating the fæces and impurities from them. For the method of purifying metals, ſee REFINING, &c.

For the purification of ſemi-metals, ſee ANTIMONY, SULPHUR, &c.

PURIM, or *the Feaſt of Lots*, a ſolemn feſtival of the Jews, inſtituted in memory of the deliverance they received from Haman's wicked attempt to deſtroy them by means of Mordecai and Eſther.

PURITAN, a name formerly given in deriſion to the diſſenters from the church of England, on account of their profeſſing to follow the pure word of God, in oppoſition to all traditions and human conſtitutions.

PURLIEU, *Purlue*, *Pourallee*, a circuit of ground adjoining to the foreſt, and circumſcribed with immoveable boundaries, known only by matter of record; which compaſs of ground was once a foreſt, and afterwards diſafforeſted by the perambulations made for ſevering the new foreſt from the old.

PURLIEU *Man*, is one who has land within the purlieu; and is allowed or qualified to hunt or courſe within the ſame, though under certain reſtrictions, as aſcertained by an act of parliament made in king Charles IId's time.

PURPLE, *Purpura*, a red colour bordering on violet, dyed chiefly with cochineal or ſcarlet in grain.

Purple was much eſteemed among the ancients, eſpecially the Tyrian purple, which underwent more dyes than the reſt, and which was almoſt peculiar to emperors and kings. Yet this purple did not exceed that now in uſe; the chief reaſons why the former has been diſuſed, are, that the latter is both cheaper and finer.

The ancient purple was tinged or given with the blood or juice of a precious turbinated teſtaceous ſea-fiſh, called by the Latins purpura; whereof we have deſcriptions in ſeveral authors, and ſhells in moſt of the cabinets of the curious.

In the ſeas of the Spaniſh W. Indies about Nicoya, is found a ſhell-fiſh, which perfectly reſembles the ancient purpura, and in all probability is the very ſame: this fiſh, Gage tells us, uſually lives ſeven years; it hides itſelf a little before the dog-days, and continues to diſappear for 300 days running. They are gathered plentifully in the ſpring, and, by rubbing one againſt another, yield a kind of ſaliva or thick glair, reſembling ſoft wax: but the purple dye is in the throat of the fiſh, and the fineſt part in a little white vein; the reſt of the body is of no uſe. He adds, that the chief riches of Nicoya conſiſt in this fiſh. Cloth of Segovia, dyed with it, is ſold for 20 crowns the ell; and none but the greateſt Spaniſh lords uſe it.

Beſides the Indian purple fiſhes, we have others much nearer home. In the Philoſophical Tranſactions we have an account of a purple fiſh diſcovered in 1686 by Mr. W. Cole, on the coaſts of Somerſetſhire, South-Wales, &c. where it is found in great abundance.

The fiſh, M. Reaumur obſerves, is a kind of buccinum, a name given by the ancients to all fiſhes whoſe ſhell bears any reſemblance to a hunting-horn; and it appears from Pliny, that part of the ancient purple was taken from this kind of ſhell-fiſh: ſo that this may be eſteemed a recovery of what had been ſuppoſed intirely loſt.

The method of obtaining the colour the author deſcribes thus: the ſhell, which is very hard, being broken (with the mouth of the fiſh downwards, ſo as not to cruſh the body) and the broken pieces being picked off, there appears a white vein lying tranſverſely in a little furrow or cleft next the head of the fiſh.

In this vein is the purple matter lodged; ſome of which, being laid on linen, appears at firſt of a light green colour; and, if expoſed to the ſun, ſoon changes into a deep green, and in a few minutes into a ſea-green, and in a few more into a blue; thence it ſoon becomes of a purpliſh red, and in an hour more of a deep purple red. And here the ſun's action terminates; but by waſhing in ſcalding water and ſoap, and drying it, the colour ripens to a moſt bright beautiful crimſon, which will bear waſhing admirably without any ſtyptick.

The fiſh, he obſerves, is good food; and adds, that there are ſeveral kinds differing in ſize and ſhell, and alſo in the colour of the tinging liquor. There are ſome found on the coaſts of Poictou.

M. Reaumur has diſcovered another very different kind of purple. It is produced in oval grains about an inch long, and about one thick, full of a white liquor bordering on yellow, which cover certain ſtones or ſands, about which the buccina of Poictou uſually aſſemble.

By the experiments M. Reaumur has made, it appears that theſe grains are neither the eggs of the buccinum, nor the ſeeds of any ſea-plants, but the eggs of ſome other unknown fiſh. Theſe grains being bruiſed on a white linen, at firſt only tinge it yellow, and that inſenſibly, but in three or four minutes give it a very beautiful purple red, provided the linen be expoſed to the open air; for the air of a room, even though the win-

dows

dows be open, will not do. This colour fades a little by repeated washings.

M. Reaumur concludes, from some experiments he made, that the effect of the air on the liquor does not consist in its taking away any particles thereof, nor in giving it any new ones, but only in its agitating it, and changing the arrangement of the parts that compose it. He adds, that the liquor of the buccinum, and that of the grains, seem to be nearly of the same nature; except that the latter is more watery, and only saline, whereas the other is hot and pungent.

PURPLE, *Febris purpurea*, *purpura*, or *purple Fever*, in medicine, a disorder which proceeds from a scurvy, and is accompanied with an eruption of efflorescences on the surface of the body, sometimes with a pretty acute and malignant fever, and at other times without such a concomitant symptom, gently, though for a long time, disturbing the functions of the body.

PURPURE, *Poupre*, or *Purple*, in heraldry, according to some, is one of the five colours of armouries, mixed or compounded of glues and azure bordering on violet; according to others, of a little black and much red colour. It is represented in graving by diagonal lines drawn from the sinister chief to the dexter base point. In the coats of noblemen it is called amethyst, and, in those of princes, mercury.

PURSE, a manner of accounting money, much used in the Levant, particularly at Constantinople.

PURSER, an officer on board king's ships, East-India-men, &c. who is intrusted and charged with the provisions, beer, water, casks, &c. of the ship, and all the stores thereto belonging. He is to see the provisions received on board and stowed carefully, the men served their daily allowance, and the oldest provisions expended first; and is accountable to the government for any part of the provisions and stores as shall be lost through his neglect or ill conduct. He is to provide the ships with coals, wood, turnery-ware, candles, lanthorns, &c. He likewise is charged with the cloaths and effects of people who die on board, and he sells them at the mast to the rest of the crew, and is obliged to give a satisfactory account of the same to the executors. He is to keep a very regular muster-book for the slop-cloaths, sea-victualling, short allowance, &c. the men have been supplied with. He may sell tobacco to the seamen, not exceeding two pounds per month to a man, at the rate settled by the navy-board. He is to keep a sick-book for those sent out of the ship. He is to pass his accounts within six months after the ship is paid off at furthest, &c.

PURSIVENESS, *Pursiness*, *broken Wind*, among farriers, is the common appellation of all those diseases in horses which arise from obstructions and ulcers in the passage of the lungs.

This is usually occasioned by cold, surfeits, and other diseases not thoroughly carried off, as also unwholesome food, bad air, and hard riding, when a horse is full. The signs are, commonly, a heaving and beating of the flanks, a wheezing and rattling. Sometimes the kernels about the throat will swell, and there will be a glandulous running at the nose, which is the utmost stage of the disease, and usually reputed desperate.

For the cure of this disorder, Dr. Bracken advises that the horse should have good nourishment, much corn, but little hay; and that every other day the water given him be impregnated with half an ounce of salt-petre, and two drams of sal armoniack.

PURULENT, in medicine, something mixed with, or partaking of pus or matter.

PUS, in medicine, a white or yellowish putrid matter, formed of corrupted blood, and contained in a wound or ulcer.

PUSTULE, a pimple, or small eruption on the skin full of pus; such are the pustules of the small-pox and French-pox. See Pox.

PUTLOGS, or PUTLOCKS, in building, are short pieces of timber about seven feet long, used in building scaffolds. They lie at right angles to the wall, with one of the ends resting upon it, and the other upon the poles which lie parallel to the side of the wall of the building.

PUTREFACTION, a kind of slow corruption produced by heat and some moist fluid, particularly the air and water; which, penetrating the pores, dissolves and sets at liberty some of the more subtile parts, particularly the salts and oils, and thus loosens the compages, and changes the texture of bodies.

PUTRID, something rotten, or putrified.

PUTTY, the same with spodium. See SPODIUM.

PUTTY, in its popular sense, is a kind of paste compounded of whiting and linseed oil, beaten together to the consistence of a thick dough. It is used by glaziers for the fastening in the squares of glass in sash-windows, and by painters for stopping up the crevices and clefts in timber and wainscots, &c.

PUTTY sometimes also denotes the powder of calcined tin, used in polishing and giving the last gloss to works of iron and steel.

PYCNOSTYLE, in the ancient architecture, is a building where the columns stand very close to each other; only one diameter and a half of the column being allowed for the intercolumniations.

PYCNOTICKS, *Pycnotica*, *Incrassants*, in physick, are medicines that have a quality of cooling and condensing.

PYGME, the length between the elbow and extremity of the hand when shut; the same with CUBIT, which see.

PYGMY, *Pygmæus*, a dwarf, or person whose stature does not exceed a cubit. In antiquity, the appellation is given to a fabulous nation that inhabited Thrace, who generated and brought forth young at five years of age, which were old at eight. They were famous for the bloody war they waged with the cranes.

PYLORUS, in anatomy, is the right and lower orifice of the stomach, whereby it discharges into the intestines.

PYRAMID, in geometry, a solid standing on a square, triangular, or polygonal basis, and terminating a-top in a point. The solid content of a pyramid is equal to one-third of the perpendicular altitude multiplied by the base; because a pyramid is one-third of a prism of the same height and base. 7 *Eucl.* 12. The superficial area of a pyramid is found by adding the area of all the triangles, whereof the sides of the pyramid consist, into one sum: for the whole external surface (except the base) of any pyramid, is nothing but a system of as many triangles as the pyramid has sides. If a pyramid be cut with a plane parallel to the base, the surface of that truncated pyramid, comprehending between the parallel lines, is found by subtracting the surface of the pyramid cut off from the surface of the whole pyramid. Also the external surface of a right pyramid, that stands on a regular polygon base, is equal to a triangle, whose altitude is equal to the altitude of one of the triangles which compose it, and its base to the whole circumference of the base of the pyramid. Whence therefore the surface of a right cone (for a cone is but a pyramid of infinite sides) is equal to a triangle whose height is the side of the cone, and the base equal to the circumference of the base of the cone.

PYRAMIDAL NUMBERS, are the sums of polygonal numbers, collected after the same manner as the polygonal numbers themselves are extracted from arithmetical progressions. These are particularly called first pyramidals: the sums of the first pyramidals are called second pyramidals: the sums of those, third pyramidals, &c. in infinitum.

PYRAMIDALES MUSCULI, in anatomy, the pyramidial muscles of the abdomen.

PYRAMIDALEA CORPORA, in anatomy, two protuberances of the medulla oblongata.

The spermatick vessels are by some so called. See CORPUS *Pampiniforme*.

PYRAMIDOID, called also *Parabolick Spindle*, in geometry, a solid figure formed by the revolution of a semi-parabola round one of its ordinates.

PYRENOIDES, *Odontoides & Dentiformis Processus*, in anatomy, a tooth-like process of the second vertebra of the neck.

PYRETICKS, *Pyretica*, febrifuges, or medicines good against fevers.

PYRETOLOGIA, in pathology, the doctrine relative to fevers.

PYRITES, in natural history, a name used by Dr. Hill for a class of compound inflammable metallick bodies found in detached masses, but of no determinately angular figure. This class the doctor divides into two orders,

orders, the firſt of which, being thoſe pyritæ of a plain and ſimple internal ſtructure, comprehends two genera: the firſt genus, termed pyriplaces, are thoſe pyritæ of a ſimple internal ſtructure, and covered with an inveſtient coat or cruſt, the ſecond genus, termed gymnopyres, are thoſe pyritæ of a ſimple internal ſtructure, and not covered with a cruſt; the ſecond order being thoſe pyritæ of a regularly ſtriated internal ſtructure alſo comprehends two genera, the firſt termed pyritricha are thoſe pyritæ of a ſimply ſtriated texture; the ſecond genus, called pyritrichiphylla, are thoſe pyritæ whoſe ſtriæ terminate in foliacious ends.

This foſſile is recommended by ſome authors as an emmenagogue, but it is ſcarce ever preſcribed with this intention; the common green vitriol, or copperas of the ſhops, is made from it; and an acid ſomewhat different from that of pure vitriol may be drawn off from it by the retort, after it has been expoſed to the air till it moulders away: this is of great uſe in mineralogy, and is a ſolvent for ſeveral foſſils that none of the other acids will touch. See VITRIOL.

PYRITES is alſo applied by ſome to the marcaſites of all metals, the names whereof are varied, according to the metals they partake of.

PYROENUS, ſometimes denotes rectified ſpirit of wine, ſo called, as being rendered of a fiery nature.

PYROMANCY, among the ancients, a kind of divination performed by means of fire. They imagined they could foretel futurity by inſpecting fire and flame, conſidering which way it turned. Sometimes they added a veſſel full of urine, with its neck bound about with wool, watching on which ſide it burſt, and thence they took their augury. Sometimes they threw pitch on it, and if it took fire immediately, this was accounted a good augury.

PYROMETER, an inſtrument for meaſuring the expanſion of bodies by heat.

PYROTECHNY, *Pyrotechnia*, the ſcience which teaches the management and application of fire. It is of two kinds, military and chymical.

Military PYROTECHNY, is the doctrine of artificial fire-works and fire-arms, teaching both the ſtructure and uſe of thoſe uſed in war, as gun-powder, cannons, bombs, granadoes, carcaſſes, mines, fuſees, &c. and thoſe for amuſement, as rockets, ſtars, ſerpents, &c.

Wolfius has reduced pyrotechnia into a kind of mixed mathematical art; indeed, it will not admit of geometrical demonſtration; but he reduces it to tolerable rules, whereas before it had been treated by authors at random.

Chymical PYROTECHNY, is the art of managing and applying fire in diſtillations, calcinations, and other operations of chymiſtry. Some reckon a third kind of pyrotechnia, namely, the art of fuſing, refining, and preparing metals.

PYROTICKS, *Pyrotica*, in medicine, ſuch remedies as are either actually or potentially hot; and which will, conſequently, burn the fleſh, and raiſe an eſcar.

PYRRHICHA, in antiquity, a kind of feigned combat on horſeback for the exerciſe of the cavalry.

The Romans call this exerciſe ludus Trojanus, the Trojan game; and A. Gellius, decurſus. And it is, doubtleſs, this exerciſe that we ſee repreſented on medals by two cavaliers in front running with lances, and the word decurſio in the exergum.

PYRRICHIUS, *Periambus* or *Hegemona*, in the Greek and Latin poetry, a foot conſiſting of two ſhort ſyllables, as meus, Deus, &c.

PYRRHONIANS, *Pyrrhoniſts*, a ſect of ancient philoſophers, ſo called from their founder Pyrrho; who profeſſed to doubt of every thing, maintaining that men only judge of truth and falſhood from appearances which deceive. So that he never determined on any thing, to avoid the inconveniencies of error. Thoſe now diſtinguiſhed by the name of Pyrrhonians or ſcepticks, who, from the great number of things that are obſcure, and from their averſion to popular credulity, maintain, that there is nothing certain in the world.

The truth is, pyrrhoniſm has ſome foundation in nature: for we do not judge of things from their real eſſences, but from their relations to us, that is, how they may affect us, ſo as to do us good or harm.

The Academicks differed from the Pyrrhonians, in that they owned there were ſome things more like to truth than others. The Pyrrhonians, M. Le Clerc obſerves, were the moſt deciſive and aſſuming of all the philoſophers; ſince they muſt have firſt examined all things, to be able to determine preciſely that all things are uncertain. Add to this, that their very principle deſtroys itſelf: for if there be nothing certain, then muſt that dogma itſelf be precarious, and why ſhould it be believed preferably to the oppoſite one? ſince itſelf is come at in the ſame way as our other knowledge.

PYTHAGOREAN, or PYTHAGORICK *Syſtem*, among the ancients, was the ſame with the Copernican ſyſtem among the moderns; which ſee.

It was ſo called, as having been maintained and cultivated by Pythagoras and his followers.

PYTHAGOREANS, a ſect of ancient philoſophers, who adhered to the doctrine of Pythagoras, who was of Samos, and the pupil of Pherecydes, who flouriſhed about the 7th Olympiad, that is, 500 years before Chriſt. This ſect was called the Italick ſchool, becauſe Pythagoras, after travelling into Egypt, Chaldea, Phœnicia, and even into the Indies, to inform his underſtanding, returning home to his own country, and there, unable to bear the tyranny of Polycrates or Syloſon, he retired into the eaſtern part of Italy, then called the greater Greece, and there taught and formed his ſect. He is held to have excelled in every part of ſcience. His ſchool, in Italy, was at Crotona, out of which proceeded the greateſt philoſophers and legiſlators, Zaleucus, Charondas, Archytas. He endeavoured to aſſuage the paſſions of the mind with verſes and numbers, and compoſed his mind every morning by his harp, frequently ſinging the pæans of Thales. Exerciſes of the body, alſo, made a conſiderable part of his diſcipline. Beſides his publick ſchool, Pythagoras had a college in his own houſe, called cœnobium: in this were two claſſes of ſcholars, exoterici or auſcultantes, and intrinſeci. The former were novices, who were under a long examen, and even impoſed a quinquennial ſilence. The latter were called genuini, perfecti, mathematici, and, by way of eminence, Pythagoreans. Theſe alone were let into the arcana of the real Pythagorick diſcipline.

Pythagoras taught that God is one, that he is a moſt ſimple, incorruptible, and inviſible being; and, therefore, only to be worſhipped with a pure mind, with the ſimpleſt rites, and thoſe preſcribed by himſelf.

In his converſation with the Egyptians, he learned abundance of ſecrets about numbers, ſo that he even attempted to explain all things in nature thereby. In effect, this was the common opinion of the ancient philoſophers, that the ſpecies of things have to each other the nature and relation of numbers.

Pythagoras further taught, that there is a relation or kinſhip between the gods and men, and, therefore, that the former take care of the latter. He alſo aſſerted a metempſychoſis, or tranſmigration of ſouls; and, conſequently, their immortality. And taught that virtue is harmony, health, and every good thing.

PYTHAGORICK THEOREM, or propoſition, is the 47th of the firſt book of Euclid.

PYTHIA, in antiquity, the prieſteſs of Apollo, by whom he delivered oracles, and from whom ſhe took her name.

She was to be a pure virgin, and ſat on the lid of a brazen veſſel mounted on a tripod, and thence, after a violent enthuſiaſm, rehearſed a few obſcure verſes, which were taken for oracles.

PYTHIA, or *Pythian Games*, were ſolemn games inſtituted in honour of Apollo, and in memory of his killing the ſerpent Python.

The Pythia were celebrated at Pythium in Macedonia, and were next in fame to the Olympick games, but more ancient than they. They were held every two years about the month Elaphebolion, or our February.

There were Pythia alſo celebrated at Delphos, which were the moſt renowned. A part of Pindar's poems were compoſed in praiſe of the victors at the Pythian games.

PYXIS NAUTICA, in navigation, the mariner's compaſs.

PYXIS, in anatomy, is the acetabulum or hollow in the hip-bone.

PYXIS, is alſo a ſurgeon's box, which is divided into compartments for containing various ſorts of unguents.

PYXIS, in the Romiſh church, the name given to the box in which they carry the ſacrament to the ſick.

Q.

Q, A consonant, and the 16th letter of the alphabet; and, though it is not in the old Greek or Latin alphabet, is yet derived from the more ancient Hebrew ᚣ, by turning the character and making the angular apex round, and carrying the perpendicular part obliquely under the round one; and from thence also the modern Hebrew character ק koph of the same letter. In the Latin, the use or disuse of the Q seems to have been so little settled, that the poets used the Q or C indifferently, as best suited their measures; it being a rule, that the Q joined the two following vowels into one syllable, and that the C imported them to be divided. The Saxons had not this letter, but expressed it by *c p*, as in *cpacian*, to quake, &c.

In the French, the sound of the Q and K are so near a-kin, that some of their nicest authors think the former might be spared.

In English, the Q is formed in the voice in a different manner from K, the cheeks being contracted, and the lips, especially the under one, put into a cannular form for the passage of the breath. It is, however, never sounded alone, but in conjunction with *u* after it, either in Latin or English, as in qualis, quantum, qualm, queen, oblique, &c. and it never ends any English word.

Q, among the ancients, was a numeral denoting 500, as in this verse,

Q velut A cum D quingentos vult numerare.

Q with a dash over it, signified 500,000.

Q, is also used as an abbreviature, as, in physicians recipe's.

Q. pl. denotes quantum placet, as much as you will.

Q. S. quantum sufficit, or as much as is necessary; and Q. denotes quantity.

Q. E. D. among mathematicians, denotes quod erat demonstrandum, which was to be demonstrated.

Q. E. F. quod erat faciendum, which was to be done.

Q. D. among the grammarians, quasi diceretur, as if one should say.

QUADRA, in building, any square border encompassing a basso relievo, pannel, painters, or other work.

QUADRAGESIMA, denotes the time of Lent, as consisting of 40 days.

Quadragesima *Sunday*, is the first Sunday in Lent, as being about the 40th day before Easter; and, on the same account, the three preceding Sundays are called quinquagesima, sexagesima, and septuagesima.

QUADRANGLE, in geometry, a quadrangular or quadrilateral figure, having four angles or four sides, as the square, parallelogram, trapezium, rhombus, and rhomboides.

QUADRANT, *Quadrans*, in geometry, an arch of a circle, containing 90°, or one fourth part of the whole periphery. The space or area included between this arch and two radii drawn from the centre to each extremity thereof, is called a quadrantal space, as being a quarter of the entire circle.

Quadrant also denotes a mathematical instrument in navigation, astronomy, &c. for taking of altitudes, angles, &c. It is variously contrived, according to the various uses it is intended for; but they all have this in common, that they consist of a quarter of a circle whose limb is divided into 90°; some have a plummet suspended from the centre, and furnished with pinnulæ or sights to look through. The principal and most useful quadrants are, the common or surveying quadrant, astronomical quadrant, Cole's quadrant, Davis's quadrant, Hadley's quadrant, horal quadrant, horodictical quadrant, Gunter's quadrant, Sutton's or Collins's quadrant, and the sinical quadrant.

The common or surveying quadrant (*plate* LXIX. *fig.* 3.) is made of brass, wood, &c. usually 12 or 15 inches radius; its circular limb graduated into 90°, and as many equal parts as the space will allow, either diagonally or otherwise. On one edge or semi-diameter are fixed two immoveable sights, and in the angle or centre is hung a thread with a plummet. To the centre likewise is sometimes fixed a label or moveable index, bearing two other sights like the index of a telescope. And in lieu of the immoveable sights is sometimes fitted a telescope, though this more properly belongs to the astronomical quadrant. On the under side or face of the instrument is fitted a ball and socket, by means whereof it may be put in any position for use. Besides, there is frequently added on the face near the centre a kind of compartment called the quadrant or geometrical square, as in the figure. The quadrant is to be used in different situations. To observe heights and depths, its plane is disposed at right angles to the horizon; to take horizontal distances, the plane is disposed parallel thereto. Heights and distances may be taken two ways, either by means of the fixed sights and plummet, or by the label.

Use of the surveying Quadrant. To take the height or depth of an object, with the fixed sights and plummet. Place the quadrant vertically, and the eye under the sight next the arch of the quadrant; thus direct the instrument to the objects, suppose the top of a castle, &c. till the visual rays thereof strike through the sights upon the eye.

This done, the portion of the arch intercepted between the thread and the semidiameter, whereon the sights are fastened, shews the complement of the object's height above the horizon, or its distance from the zenith; and the other portion of the arch, between the thread and the other semidiameter, shews the height itself of the object above the horizon. The same arch likewise gives the quantity of the angle made by the visual ray, and a horizontal line parallel to the base of the tower. To observe depths, the eye must be placed over that sight next the centre of the quadrant.

From the height or depth of the object, in degrees thus found, which suppose 35°, 35′; and the distance of the foot of the object from the place of observation carefully measured, which suppose 47 feet; its height or depth in feet, yards, &c. is easily determined by the most common case in trigonometry. For we have here in a triangle one side given, namely, the line measured, and we have all the angles; for that of the castle is always supposed a right angle; the other two, therefore, are equal to another right angle; but the angle observed is 35° 35′, therefore, the other is 54° 25′.

The case then will be reduced to this, as the sine of 54° 25′, is to 47 feet; so is the sine of 35° 35′, to a fourth term 33 feet and a half; to which add the height of the observer's eye, suppose five feet, the sum 38 feet and a half is the height of the castle required. As to the taking of altitudes of objects accessible or inaccessible, see Altitude.

Use of the quadrant, in taking heights and distances by the index and sights. As to take the height of a tower that is accessible. Place the plane of the instrument at right angles to the plane of the horizon, and one of its edges parallel thereto by means of the plummet, which in that case will hang down along the other. In this situation turn the index, till through the sight you see the top of the tower; and the arch of the limb of the quadrant, between that side thereof parallel to the horizon and the index, will be the height of the tower in degrees; whence, and from the distance measured as before, its height in feet, &c. may be found by calculation, as in the former case, or without calculation, by drawing from

the

the data on paper a triangle ſimilar to the great one, whoſe baſe is the diſtance, and its perpendicular, meaſured on the ſcale, the height of the tower.

Uſe of the quadrant, in meaſuring horizontal diſtances. Though the quadrant be a leſs proper inſtrument for this purpoſe than the theodolite, ſemi-circle, or the like, by reaſon angles greater than quadrants cannot be taken hereby; yet, neceſſity often obliges one to have recourſe to it.

The manner of its application is the ſame with that of the ſemi-circle, only the one is an arch of 180°, and, therefore, can take an angle of any quantity, and the other only an arch of 90°.

Aſtronomical QUADRANT; its principal uſe is for taking obſervations of the ſun, planets, or fixed ſtars. See ASTRONOMICAL *Quadrant*.

Cole's QUADRANT, a very uſeful inſtrument for taking altitudes at ſea. It has its name from its inventor, Mr. Benjamin Cole, and conſiſts of ſix parts, viz. the ſtaff A B (*plate* LXIX *fig.* 4.) the quadrantal arch *f h*, three vanes, A, B, C, and the vernier G.

The ſtaff is a bar of wood of about two feet long, an inch and a quarter broad, and of a ſufficient thickneſs to prevent it from bending or warping.

The quadrantal arch is alſo of wood, being nearly equal in ſtrength to the ſmall arch of Davis's quadrant, and is divided into degrees, and third parts of a degree, to a radius of about nine inches; to its extremities are fixed two radii, which meet in the centre of the quadrant by a pin, round which it eaſily moves.

The ſight-vane A is a thin piece of braſs almoſt two inches in height, and one broad, placed perpendicularly on the end of the ſtaff A, by the help of two ſcrews paſſing through its foot. Through the middle of this vane is drilled a ſmall hole, like that in the ſight-vane of Davis's quadrant, through which the coincidence or meeting of the horizon and ſolar ſpot is to be viewed.

The horizon vane B is about an inch broad, and two inches and a half high, having a ſlit cut through it of near an inch long, and a quarter of an inch broad; this vane is fixed in the centre-pin of the inſtrument, in a perpendicular poſition, by the help of two ſcrews paſſing through its foot, whereby its poſition, with reſpect to the ſight-vane, is always the ſame; their angle of inclination being equal to 45 degrees.

The ſhade vane C is compoſed of two braſs plates; the one, which ſerves as an arm, is about four inches and a half long, and three quarters of an inch broad, being pinned, at one end, to the upper limb of the quadrant by a ſcrew, about which it has a ſmall motion; the other end lies in the arch, and the lower edge of the arm is directed to the middle of the centre-pin: the other plate, which is properly the vane, is about two inches long, being fixed perpendicularly to the other plate, at about half an inch diſtance from that end next the arch; this vane may be uſed either by its ſhade, or by the ſolar ſpot caſt by a convex lens placed therein. And, becauſe the wood work is often apt to warp or twiſt, therefore this vane may be rectified by the help of a ſcrew, ſo that the warping of the inſtrument may occaſion no error in the obſervation, which is performed in the following manner: ſet the line G on the vernier againſt a degree on the upper limb of the quadrant, and turn the ſcrew on the back-ſide of the limb forward or backward, till the hole in the ſight-vane, the centre of the glaſs, and the ſunk ſpot in the horizon vane, lie in a right line.

To find the ſun's altitude by this inſtrument.

Turn your back to the ſun, holding the inſtrument by the ſtaff, with your right hand, ſo that it be in a vertical plane paſſing through the ſun; apply your eye to the ſight-vane, looking through that and the horizon vane till you ſee the horizon; with the left hand ſlide the quadrantal arch upwards, until the ſolar ſpot or ſhade, caſt by the ſhade vane, fall directly on the ſpot or ſlit in the horizon vane; then will that part of the quadrantal arch, which is raiſed above G or S (according as the obſervation reſpected either the ſolar ſpot or ſhade) ſhew the altitude of the ſun at that time. But, if the meridian altitude be required, the obſervation muſt be continued, and, as the ſun approaches the meridian, the ſea will appear through the horizon vane, and then is the obſervation finiſhed; and the degrees and minutes, counted as before, will give the ſun's meridian altitude: or the degrees counted from the lower limb upwards will give the zenith diſtance.

Davis's QUADRANT. This inſtrument has its name from Capt. Davis, its inventor, and is no other than a common quadrant, leſſened in one part of the arch, by ſuppoſing it to be divided into two different arches, by a concentrick circle, whereby the inſtrument becomes more portable.

Hadley's QUADRANT, the moſt uſeful inſtrument for taking altitudes at ſea yet extant. It has its name from the inventor, J. Hadley, Eſq; and is compounded of the following particulars. 1. An octant ABC (*plate* LXIX. *fig.* 7.) 2. The index D. 3. The ſpeculum E. 4. Two horizontal glaſſes, F and G. 5. Two ſkreens K and K. 6. Two ſight-vanes, H and I. The octant conſiſts of the arch BC, two radii or limbs, AB, AC; and the two braces L and M, which are to hold it by, ſtrengthen and prevent its warping. The arch B C is only one eighth of a circle, but is divided into 90 primary diviſions, each of which repreſent degrees, and are numbered 0, 10, 20, &c. to 90, from each end of the arch; and every degree is ſubdivided into ſuch parts as will, by help of the index, ſhew the minutes of each degree. The index D is a flat bar, which moves round the centre of this inſtrument, and that part of it which ſlides over the graduated arch BC, is open in the middle, to ſee the diviſions which are cut by another ſcale placed in the lower part of the ſaid opening. The ſpeculum is a piece of flat glaſs quickſilvered on one ſide, ſet in a braſs box, and placed perpendicular to the plane of the inſtrument, the middle part of the former coinciding with the centre of the latter. And, becauſe the ſpeculum is fixed to the index, the poſition of it will be altered by the moving of the index along the arch. The rays of an obſerved object are received on the ſpeculum, and from thence reflected on one of the horizon glaſſes.

The horizon glaſſes are two ſmall pieces of looking-glaſs placed on one of the limbs, their faces being turned obliquely to the ſpeculum, from whence they revive the reflected rays of obſerved objects. This glaſs, F, has only its lower part quickſilvered, and ſet in braſs work; the upper part being left tranſparent to view the horizon. The glaſs G has in its middle a tranſparent ſlit, through which the horizon is to be ſeen. And becauſe the warping of the wood work, and other accidents, may diſtend them from their true ſituation, there are three ſcrews paſſing through their feet, whereby they may be eaſily replaced. The ſkreens are two pieces of coloured glaſs, ſet in two ſquare braſs frames K, K, which ſerve as ſkreens to take off the glare of the ſun's rays, which would be otherwiſe too ſtrong for the eye; the one is tinged much deeper than the other; and, as both of them move on the ſame centre, they may be both or either of them uſed: in the ſituation they appear in the figure, they ſerve the horizon glaſs F; but, when they are wanted for the horizon glaſs G, they muſt be taken from their preſent ſituation, and placed on the quadrant above G.

The ſight-vanes are two pins, H and I, ſtanding at right angles to the plane of the inſtrument; that at H has one hole in it, oppoſite to the tranſparent ſlit in the horizon glaſs G; the other at I has two holes in it, the one oppoſite to the middle of the tranſparent part of the horizon glaſs F, the other rather lower than the quickſilvered part; this vane has a piece of braſs on the back of it, which moves round a centre, and ſerves to cover either of the holes.

There are two ſorts of obſervations to be made with this inſtrument; the one, when the back of the obſerver is turned towards the object, and therefore called the back obſervation; the other, when the face of the obſerver is turned towards the object, which is called the fore obſervation.

To rectify the inſtrument for the fore obſervation.

Slacken the ſcrew in the middle of the handle behind the glaſs F; bring the index cloſe to the button *b*, hold the inſtrument in a vertical poſition, with the arch downwards; look through the right hand hole in the vane I, and through the tranſparent part of the glaſs F, for the horizon; and if it lies in the ſame right line with the image of the horizon, ſeen on the quickſilvered part, the glaſs F is rightly adjuſted; but, if the two horizontal lines diſagree, turn the ſcrew at the end of the handle

handle backwards or forwards, until thofe lines coincide, then faften the middle fcrew of the handle, and the glafs is rightly adjufted.

To rectify the inftrument for the back obfervation. Slacken the fcrew in the middle of the handle, behind the glafs G; turn the button *b* on one fide, and bring the index as many degrees before *o*, as is twice the drip of the horizon at your height above the water; hold the inftrument vertical with the arch downwards, look through the hole of the vane H, and if the horizon, feen through the tranfparent flit in the glafs G, coincides with the image of the horizon, feen in the quickfilvered part of the fame glafs; then the glafs G is in its proper pofition. But, if not, fet it by the handle, and faften the fcrew as before.

To take the fun's altitude by the back obfervation. Put the ftem of the fkreens K, K, into the hole *r*, and, in proportion to the ftrength or faintnefs of the fun's rays, let one, both, or neither of the frames of thofe glaffes be turned clofe to the face of the limb; hold the inftrument in a vertical pofition, with the arch downwards, by the braces L, M, with your left hand; turn your back towards the fun, and put your eye clofe to the hole, in the vane H, obferving the horizon through the tranfparent flit in the horizon glafs G; with your right hand move the index D, till the reflected image of the fun be feen in the quickfilvered part of the glafs G, and in a right line with the horizon; fwing your body to and fro, and, if the obfervation be well made, the fun's image will be obferved to brufh the horizon, and the degrees reckoned from C, or that part of the arch fartheft from your body, will give the fun's altitude, at the time of obfervation, obferving to add 16 min. = the fun's femidiameter, if the fun's upper edge be ufed, and fubtracting 16 min. from the altitude, if the obfervation refpected the lower edge.

To take the fun's altitude by the fore obfervation. Having fixed the fkreen above the horizon glafs F, and fuited them proportionally to the ftrength of the fun's rays, turn you face towards the fun, holding the inftrument with your right hand, by the braces L M, in a vertical pofition, with the arch downwards; put your eye clofe to the right hand hole in the vane I, and view the horizon through the tranfparent part of the horizon glafs F, moving at the fame time the index D with your left hand, till the reflex folar fpot coincides with the line of the horizon; then the degrees counted from C, or that end next your body, will give the altitude of the fun at that time, obferving to add or fubtract 16 min. according to the upper or lower edge of the fun's reflex image being made ufe of. But to obtain the fun's meridian altitude, which is the thing wanted, in order to find the latitude; the obfervations muft be continued, and, as the fun approaches the meridian, the index D muft be continually moved towards B, in order to maintain the coincidence between the reflex folar fpot and the horizon; and confequently, as long as this motion can maintain the fame coincidence, the obfervation muft be continued; and when the fun has attained the meridian, and begins to defcend, the coincidence will require a retrograde motion of the index, or towards C, and then is the obfervation finifhed, and the degrees counted, as before, will give the fun's meridian altitude, or thofe from B, the zenith diftance.

Horodictical QUADRANT, a pretty commodious inftrument, fo called from its ufe in telling the hour of the day.

Conftruction and Ufe of the horodictical QUADRANT. From the centre of the quadrant C, (*plate* LXIX. *fig.* 5.) whofe limb A B is divided into 90°, defcribe feven concentrick circles at intervals at pleafure; and to thefe add the figns of the zodiack, in the order reprefented in the figure. Then, 2. applying a ruler to the centre C, and the limb A B, mark upon the feveral parallels the degrees correfponding to the altitude of the fun when therein, for the given hours; connect the points belonging to the fame hour with a curve line, to which add the number of the hour. To the radius C A fit a couple of fights, and to the centre of the quadrant C tie a thread with a plummet, and upon the thread a bead to flide. If now the bead be brought to the parallel wherein the fun is, and the quadrant directed to the fun, till a vifual ray pafs through the fights, the bead will fhew the hour. For the plummet in this fituation, cuts all the parallels in the degrees correfponding to the fun's altitude. Since then the bead is in the parallel which the fun defcribes, and, through the degrees of altitude to which the fun is elevated every hour, there pafs hour-lines, the bead muft fhew the prefent hour. Some reprefent the hour-lines by arches of circles, or even by ftraight lines, and that without any fenfible error.

Gunter's QUADRANT, fo called from the inventor our countryman, Edmund Gunter. This, befides the apparatus, of other quadrants, has a ftereographical projection of the fphere on the plane of the equinoctial, with the eye placed in one of the poles. (See *plate* LXIX. *fig.* 6.)

Ufe of Gunter's quadrant. 1. To find the fun's meridian altitude for any given day, or the day of the month for any given meridian altitude. Lay the thread to the day of the month in the fcale next the limb; the degree it cuts in the limb, is the fun's meridian altitude. Thus the thread, being laid on the 15th of May, cuts 59° 30′, the altitude fought; and contrarily the thread, being fet to the meridian altitude, fhews the day of the month.

2. *To find the hour of the day.* Having put the bead, which flides on the thread, to the fun's place in the ecliptick, obferve the fun's altitude by the quadrant; then, if the thread be laid over the fame in the limb, the bead will fall upon the hour required. Thus, fuppofe on the 10th of April, the fun being then in the beginning of Taurus, we obferve the fun's altitude by the quadrant to be 36°; we place the bead to the beginning of Taurus in the ecliptick, and lay the thread over 36° of the limb; and find the bead to fall on the hour-line marked 3 and 9; accordingly the hour is either 9 in the morning, or 3 in the afternoon. Again, laying the bead on the hour given, having firft rectified, or put it to the fun's place, the degree cut by the thread on the limb gives the altitude.

Note, the bead may be rectified otherwife, by bringing the thread to the day of the month, and the bead to the hour-line of 12.

3. *To find the fun's declination from his place given, and contrariwife.* Set the bead to the fun's place in the ecliptick, move the thread to the line of declination E T, and the bead will cut the degree of declination required. Contrarily, the bead being adjufted to a given declination, and the thread moved to the ecliptick, the bead will cut the fun's place.

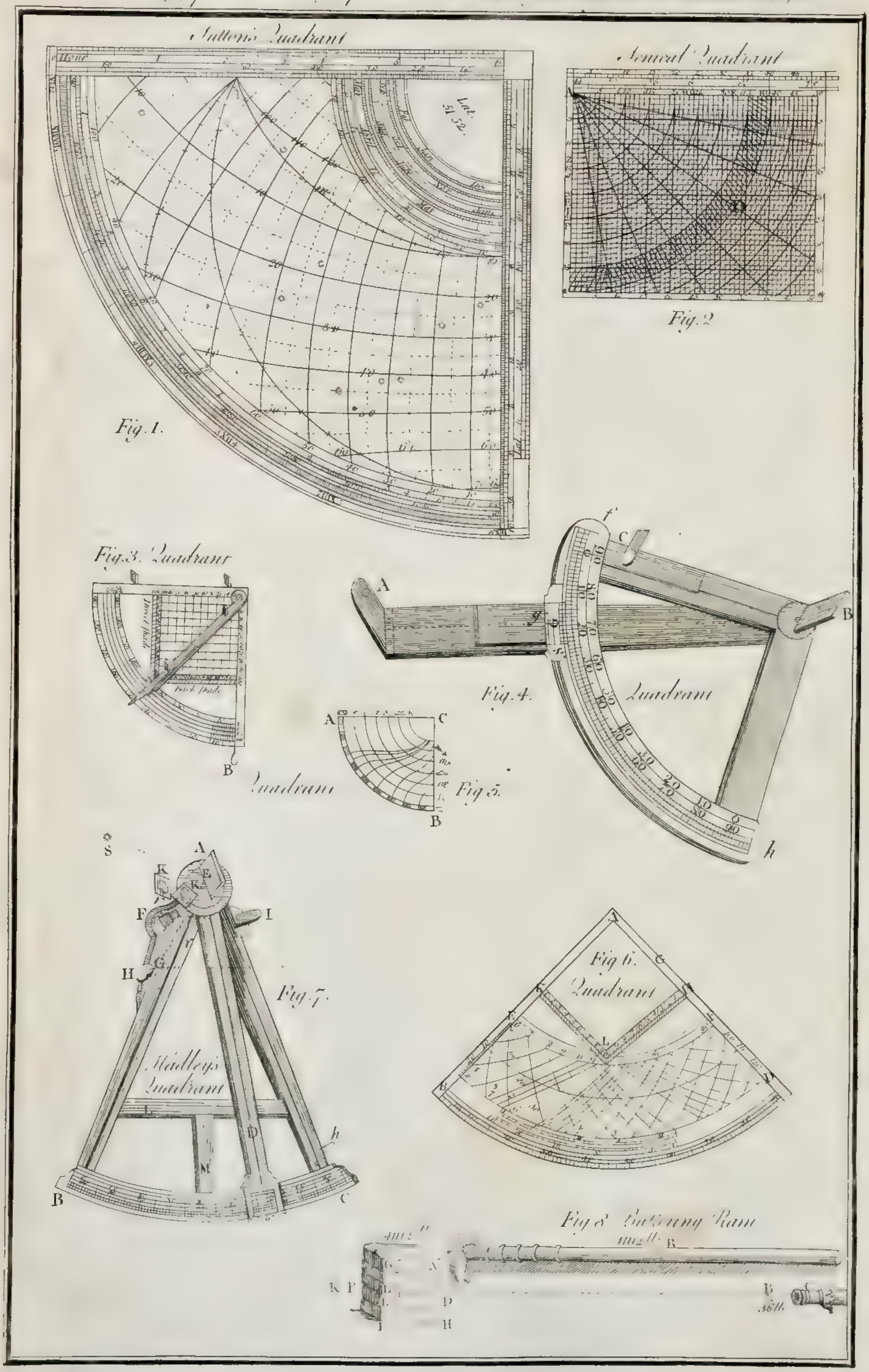
4. *The fun's place being given, to find his right afcenfion, or contrarily.* Lay the thread on the fun's place in the ecliptick, and the degree it cuts on the limb is the right afcenfion fought. Contrarily, laying the thread on the righ afcenfion, it cuts the fun's place in the ecliptick.

5. *The fun's altitude being given to find his azimuth, and contrariwife.* Rectify the bead for the time, as in the fecond article, and obferve the fun's altitude; bring the thread to the complement of that altitude; thus the bead will give the azimuth fought among the azimuth lines.

6. *To find the hour of the night from fome of the five ftars laid down on the quadrant.* 1. Put the head to the ftar you would obferve, and find how many hours it is off the meridian, by article 2. Then from the right afcenfion of the ftar, fubtract the fun's right afcenfion converted into hours, and mark the difference; which difference, added to the obferved hour of the ftar from the meridian, fhews how many hours the fun is gone from the meridian, which is the hour of the night. Suppofe on the 15th of May the fun is in the 4th degree of Gemini, we fet the bead to Arcturus; and, obferving his altitude, find him in the weft to be about 52° high, and the bead to fall on the hour-line of 2 in the afternoon; then will the hour be 11 hours 50 min. paft noon, or 10 min. fhort of midnight: for 62°, the fun's right afcenfion, converted into time, makes 4 hours 8 min. which fubtracted from 13 hours 58 min. the right afcenfion of Arcturus, the remainder will be 9 hours 50 min. which added to 2 hours, the obferved diftance of Arcturus from the meridian, fhews the hour of the night to be 11 hours 50 min.

Sutton's fometimes called *Collins's Pocket*-QUADRANT, as reprefented (*plate* LXIX. *fig.* 1.) is a ftereographick projection of one quarter of the fphere, between the tropicks, upon the plane of the equinoctial, the eye being in the north pole. It is fitted to the latitude of London.

 The


Sutton's Quadrant
Lat. 51.32.
Fig. 1.
General Quadrant
Fig. 2
Fig. 3. Quadrant
B
C
A
C
B
Quadrant
Fig. 5.
A
B
Fig. 4.
Quadrant
h
S
A
K
E
F
I
H
G
Fig. 7.
Hadley's Quadrant
D
M
h
B
C
Fig. 6.
Quadrant
Fig. 8. Battering Ram
K F
D
H
B

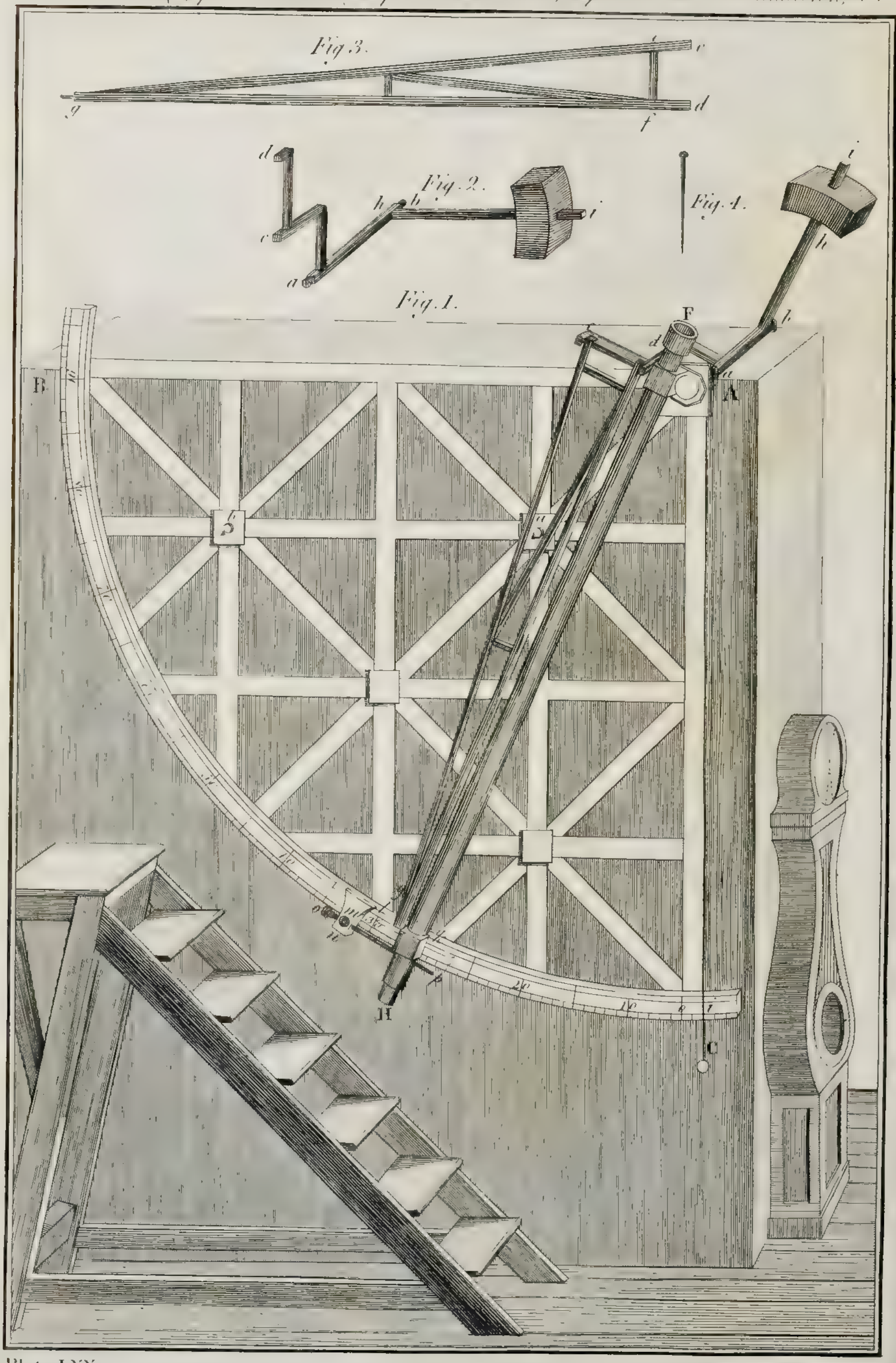


Plate LXX

facing Mural Quadrant.

The lines, running from the right hand to the left, are parallels of altitude; and thoſe croſſing them are azimuths. The leſſer of the two circles, bounding the projection, is one fourth of the tropick of Capricorn; the greater is one fourth of that of Cancer. The two eclipticks are drawn from a point on the left edge of the quadrant, with the characters of the ſigns upon them; and the two horizons are drawn from the ſame point. The limb is divided both into degrees and time; and, by having the ſun's altitude, the hour of the day may be found here to a minute. The quadrantal arches next the centre contain the calendar of months; and under them in another arch is the ſun's declination.

On the projection are placed ſeveral of the moſt noted fixed ſtars between the tropicks; and the next below the projection is the quadrant and line of ſhadows.

Uſe of Sutton's or Collin's QUADRANT: *To find the time of the ſun's riſing or ſetting, his amplitude, his azimuth, hour of the day, &c.* Lay the thread over the day and the month, and bring the bead to the proper ecliptick, either of ſummer or winter, according to the ſeaſon, which is called rectifying; then, moving the thread, bring the bead to the horizon, in which caſe the thread will cut the limb in the time of the ſun's riſing or ſetting, before or after ſix; and at the ſame time the bead will cut the horizon in the degrees of the ſun's amplitude. Again, obſerving the ſun's altitude with the quadrant, and ſuppoſing it found 45° on the 24th of April, lay the thread over the 24th of April, bring the bead to the ſummer ecliptick, and carry it to the parallel of altitude 45°; in which caſe the thread will cut the limb at 55° 15′, and the hour will be ſeen among the hour-lines to be either 41′ paſt nine in the morning, or 19′ paſt two in the afternoon.

Laſtly, the bead among the azimuths ſhews the ſun's diſtance from the ſouth 50° 41′.

But note, that if the ſun's altitude be leſs than what it is at ſix o'clock, the operation muſt be performed among thoſe parallels above the upper horizon; the bead being rectified to the winter ecliptick.

Sinical QUADRANT, in navigation, as repreſented (*plate* LXIX. *fig.* 2.) conſiſts of ſeveral concentrick, quadrantal arches, divided into eight equal parts by radii with parallel right lines croſſing each other at right angles. Now any of the arches BC may be accounted a quadrant of any of the great circles of the ſphere, chiefly of the horizon and meridian; if then BC be taken for a quadrant of the horizon, either of the ſides as AB may repreſent the meridian; and the other AC will repreſent a parallel, or line of eaſt and weſt; and all the other lines parallel to AB will alſo be meridians; and all thoſe parallel to AC, eaſt or weſt parallels, or eaſt and weſt lines. Again, the eight ſpaces into which the arches are divided by the radii, repreſent the eight points of the compaſs in a quarter of the horizon; each containing 11° 15′.

The arch BC is likewiſe divided into 90°, and each degree ſubdivided into 12′, diagonal-wiſe.

To the centre is fixed a thread, as AL; which being laid over any degree of the quadrant, ſerves to divide the horizon.

If the ſinical quadrant be taken for a fourth part of the meridian, one ſide thereof AB may be taken for the common radius of the meridian and equator; and then the other AC will be half the axis of the world. The degrees of the circumference BC will repreſent degrees of latitude, and the parallels to the ſide AB, aſſumed from every point of latitude to the axis AC, will be radii of the parallels of latitude, as likewiſe the ſine complement of thoſe latitudes.

Suppoſe then it be required to find the degrees of longitude contained in 83 of the leſſer leagues, in the parallel of 48°. Lay the thread over 48° of latitude on the circumference, and count thence the 83 leagues, or AB beginning at A; this will terminate in H, allowing every ſmall interval four leagues. Then tracing out the parallel HG, from the point H to the thread; the part AG of the thread ſhews the 125 greater or equinoctial leagues make 6° 15′; and therefore that the 83 leſſer leagues AH, which makes the difference of longitude of the courſe, and are equal to the radius of the parallel GI, make 6° 15′ of the ſaid parallel.

If the ſhip ſails an oblique courſe, ſuch courſe, beſides the north and ſouth greater leagues, gives leſſer leagues eaſterly and weſterly, to be reduced to degrees of longitude of the equator. But theſe leagues being made neither on the parallel of departure, nor on that of arrival, but in all the intermediate ones; we muſt find a mean proportional parallel between them.

To find this, we have on the inſtrument a ſcale of croſs latitudes. Suppoſe then it were required to find a mean parallel between the parallels of 40° and 60°: with your compaſſes take the middle between the 40th and 60th degree on the ſcale; this middle point will terminate againſt the 51ſt degree, which is the mean parallel required.

Uſe of the ſinical QUADRANT is to form triangles upon, ſimilar to thoſe made by a ſhip's way, with the meridian and parallels; the ſides of which triangles are meaſured by the equal intervals between the concentrick quadrants, and the lines N and S, E and W. The lines and arches are diſtinguiſhed, every fifth, by a broader line, ſo that if each interval be taken for one league, there will be five between one broad line and another. Now, ſuppoſe a ſhip to have ſailed 150 leagues north-eaſt, one-fourth north, which is the third point, and makes an angle 33° 45′ with the north part of the meridian. Here are given two things, namely, the courſe and diſtance ſailed, by which a triangle may be formed on the inſtruments, ſimilar to that made by the ſhip's courſe, and her longitude and latitude; and hence may the unknown parts of the triangle be found.

Thus, ſuppoſing the centre A to repreſent the place of departure; count, by means of the concentrick arches, along the point the ſhip ſailed in, as AD, 150 leagues from A to D; then is the point D the place the ſhip is arrived at, which note. This done, let DE be parallel to the ſide; and then there will be formed a right-angled triangle AED, ſimilar to that of the ſhip's courſe, difference of longitude and latitude: the ſide AE gives 125 leagues for the difference of the latitude northwards, which makes 6° 15′; and the ſide DE gives 83 leſſer leagues anſwering to the parallels, which being reduced, as ſhewn above, gives the difference of longitude. And thus is the whole triangle formed.

Mural QUADRANT, or, as it is often called, mural arch, an aſtronomical inſtrument for taking the altitude of any heavenly object, when it tranſits the meridian.

This inſtrument is fixed to a wall erected exactly in the plane of the meridian, and was firſt uſed by that able aſtronomer Mr. Flamſtead, who, after the greateſt labour and ſtudy, fixed a mural quadrant in the royal obſervatory at Greenwich.

Explanation of (plate LXX.) *repreſenting a mural quadrant in perſpective.*

Fig. 1. Is a part of the wall, with the mural quadrant fixed to it, and furniſhed with its whole apparatus for making aſtronomical obſervations.

BC, the limb of the inſtrument, accurately divided.

A, the centre of the quadrant.

a, b, places where the quadrant is fixed to the wall.

a, b, c, d, h, i, the counterpoiſe.

k, l, the nonius.

m, a piece fixed to the limb of the inſtrument by means of the ſcrew *n.*

H, F, the teleſcope.

o, p, a ſcrew by which the teleſcope is moved.

Fig. 2. *a, b, c, d, h, i,* the upper part of the counterpoiſe ſeparated from the inſtrument.

Fig. 3. *c, d, f, g,* the lower part of the counterpoiſe.

Fig. 4. The pin at *g,* (*fig.* 3.) repreſented larger.

QUADRANT, in gunnery, or gunner's ſquare, is an inſtrument for elevating or pointing cannon, mortars, &c. according to the places they are to be levelled at. It conſiſts of two branches, made of braſs or wood; one about a foot long, eight lines broad, and one line in thickneſs, the other four inches long, and the ſame thickneſs and breadth as the former. Between theſe branches is a quadrant divided into 90°, beginning from the ſhorter branch, and furniſhed with thread and plummet. To uſe this inſtrument, place the longeſt branch in the mouth of the cannon, &c. and elevate or lower it, till the thread cut the degree neceſſary to hit a propoſed object. Sometimes on one of the ſurfaces of the long branch, are noted the diviſion of diameters, and weights of iron bullets, as alſo the bores of pieces.

QUADRANT *of Altitude*, is an appendage of the artificial globe, consisting of a lamina, or slip of brass, the length of a quadrant of one of the great circles of the globe, and graduated. At the end, where the division terminates, is a nut rivetted on, and furnished with a screw, by means whereof the instrument is fitted on to the meridian, and moveable round upon the rivet, to all points of the horizon.

QUADRANTAL, in antiquity, called also amphora, a vessel, square like a die, in use among the Romans for the measuring of liquids.

It contained 80 libræ or pounds of water, and equal to 48 sextaries, 2 urnæ, or 8 congii.

QUADRANTAL *Triangle*, is a spherical triangle, one of whose sides, at least, is a quadrant of a circle, and one of its angles a right angle.

QUADRAT, *Quadratum*, or the *geometrical Square* or *Line of Shadows*, is an additional member on the face of the common Gunter's and Sutton's quadrants, of use in taking altitudes, &c. The quadrat KLH (*plate* LXIX. *fig.* 6.) has each of its sides divided into 100 equal parts, commencing from the extremes; so as the number 100 falls on the angle, and representing tangents to the arch of the limb. The divisions are distinguished by little lines from 5 to 5, and by numbers from 10 to 10; and the divisions being occasionally produced across, form a kind of lattice, consisting of 10,000 little squares. The proportion here is, as the ratio is to the tangent of altitude at the place of observation, that is, to the parts of the quadrat cut by the thread; so is the distance between the station and foot of the object to its height above the eye.

The use of the QUADRAT. 1. The quadrat being vertically placed, and the sights directed to the top of the object, whose height is required; if the thread cut the side of the quadrat marked right shadows, the distance from the base of the object to the point of station is less than the objects height: if the thread fall on the diagonal of the square, the distance is just equal to the height: if it fall on that side marked versed shadows, the distance exceeds the height. Hence, measuring the distance, the height is found by the rule of three, inasmuch as there are three terms given. Indeed, their disposition is not always the same; for when the thread cuts the side of the right shadows, the first term of the rule of three ought to be that part of the side cut by the thread; the second the side of the square; and the third the distance measured. If the thread cut the other side, the first term is the whole side of the square, the second the parts of the side cut by the thread, and the third the distance. Suppose, for instance, in looking at the top of a steeple, the thread cut the side of right shadows in the point 40, and that the distance measures 20 poles, the case will stand thus: as 40 is to 100, so is 20 to a fourth term; which is found to be 50, the height of the steeple in poles. Again, supposing the thread to fall on the other side, in the point 50, and the distance to measure 35 poles, the terms are to be disposed thus; as 100 is to 60, so is 35 to a fourth term, namely, 21, the height required.

Use of the QUADRAT *without Calculation.* If the divisions of the square are produced both ways, so as to form the area into little squares.

Thus, suppose 1. the thread to fall on 40 in the side of right shadows, and the distance be measured 20 poles; seek, among the little squares, for that perpendicular to the side which is 20 parts from the thread; this perpendicular will cut the side of the square next the centre in the point 50, which is the height required in poles.

2. If the thread cut the side of the versed shadows in the point 60, and the distance be 35 poles, count 35 parts on the side of the quadrat from the centre; count also the divisions or the perpendicular from the point 35 to the thread, which will be 21, the height of the tower in poles. Note, that in all cases, the height of the centre of the instrument is to be added.

QUADRAT, in astrology, called also quartile, is an aspect of the heavenly bodies, wherein they are distant from each other a quadrant, or 90°. This is held a malign aspect.

QUADRAT, in printing, is a sort of space, cast like the letters, but shorter, to be used occasionally in composing, in order to form the intervals between words, particularly for breaks, the end of lines, &c.

There are *m* quadrats and *n* quadrats, which are respectively of the dimensions of such letters.

QUADRATICK EQUATION, in algebra, is that which involves one unknown quantity, and, at the same time, involves the square of that quantity, and the product of it multiplied by some known quantity. This kind of equations may be resolved by the following rule:

1. Transpose all the terms that involve the unknown quantity to one side, and the known terms to the other side of the equation.

2. If the square of the unknown quantity is multiplied by any co-efficient, you are to divide all the terms by that co-efficient, that the co-efficient of the square of the unknown quantity may be an unit.

3. Add to both sides the square of half the co-efficient prefixed to the unknown quantity itself, and the side of the equation that involves the unknown quantity, will then be a complete square.

4. Extract the square root from both sides of the equation, which you will find, on one side, always to be the unknown quantity with half the foresaid co-efficient subjoined to it; so that by transposing this half, you may obtain the value of the unknown quantity expressed in known terms.

QUADRATING *of a Piece*, among gunners, is the due placing of a piece of ordnance, and poising it in its carriage, and having its wheels of an equal height, &c. See the article GUNNERY.

QUADRATO-CUBUS, *Quadrato*, *Quadrato-Cubus*, and *Quadrato-Cubo-Cubus*, according to Diophantus, Vieta, Oughtred, &c. denotes the fifth, seventh, and eighth powers. See POWER.

QUADRATO-*Quadratum*, or *Biquadratum*, the fourth power of numbers, or the product of the cube when multiplied by the root.

QUADRATRIX, in geometry, a mechanical line, by means whereof we can find right lines equal to the circumference of circles, or other curves, and their several parts,

QUADRATRIX *of Dinostratus*, so called from its inventor Dinostrates, is a curve, whereby the quadrature of the circle is effected mechanically.

QUADRATRIX *Tschirnhausiana*, is a transcendental curve invented by M. Tschirnhausen, whereby the quadrature of the circle is likewise effected.

QUADRATUM-CUBI, *Quadrato-Quadrato-Quadratum*, and *Quadratum-Surdesolidi*, according to the Arabs, denote the sixth, eighth, and tenth powers of numbers. See POWER.

QUADRATURE, *Quadratura*, in geometry, denotes the squaring, or reducing a figure to a square. Thus, the finding of a square, which shall contain just as much surface or æra as a circle, an ellipsis, a triangle, &c. is the quadrature of a circle, ellipsis, &c.

QUADRATURE, in astronomy, that aspect of the moon when she is 90° distant from the sun; or when she is in a middle point of her orbit, between the points, of conjunction and opposition, namely, in the first and third quarters. See MOON.

QUADRATURE-*Lines*, are two lines placed on Gunter's sector: they are marked with Q. and 5, 6, 7, 8, 9, 10; of which Q. signifies the side of the square, and the other figures the sides of polygons of 5, 6, 7, &c. sides. S. on the same instrument, stands for the semidiameter of a circle, and 90 for a line equal to 90° in circumference.

QUADRATUS, in anatomy, a name given to several muscles on account of their square figure.

QUADREL, in building, a kind of artificial stone, so called from its being perfectly square.

The quadrels are made of a chalky earth, &c. and dried in the shade for two years. These were formerly in great request among the Italian architects.

QUADRILATERAL, in geometry, a figure whose perimeter consists of four right lines, making four angles; whence it is also called a quadrangular figure.

The quadrilateral figures are either a parallelogram, trapezium, rectangle, square, rhombus, or rhomboides.

QUADRIL, *Quadrilla*, a little troop or company of cavaliers, pompously dressed, and mounted for the performance of carousals, justs, tournaments, runnings at the ring, and other gallant divertisements.

QUADRILLE,

QUADRILLE, a game at cards, fometimes called ombre by four; which chiefly differs from ombre by three, in being played by four perfons, and having all the 40 cards dealt out, to each perfon, at 10 each.

QUADRUPEDS, *Quadrupedia*, in zoology, a clafs of land animals, with hairy bodies, and four limbs or legs proceeding from the trunk of their bodies: add to this, that the females of this clafs are viviparous, or bring forth their young alive, and nourifh them with milk from their teats.

QUADRUPLE, a fum or number multiplied by four, or taken four times.

This word is particularly ufed for a gold coin, worth four times as much as that whereof it is the quadruple.

QUAKERS, a religious fect, which made its firft appearance in England during the interregnum; fo called, in derifion, from certain unufual tremblings with which they were feized at their firft meetings.

Their founder was George Fox, a fhoe-maker, born at Draiton, in Leicefterfhire; who, as he worked at his trade, ufed to meditate much on the fcriptures: at length he began to fee vifions, and fet up for a preacher.

He propofed but few articles of faith, infifting chiefly on moral virtue, mutual charity, the love of God, and a deep attention to the inward motions and fecret operations of the Spirit. He required a plain fimple worfhip, and a religion without ceremonies, making it a principal point to wait in profound filence the directions of the Holy Spirit.

Quakers were at firft guilty of fome extravagancies, but thefe wore off, and they fettled into a regular body, profeffing great aufterity of behaviour, a fingular probity and uprightnefs in their dealings, a great frugality at their tables, and a remarkable plainnefs and fimplicity in their drefs.

QUALIFICATOR, in the cannon law, a divine appointed to qualify, or declare the quality of a propofition brought before an ecclefiaftical tribunal, chiefly before the inquifition. The qualificators of the office are not judges, they only give their fentiments on the propofition prefented to them.

QUALITY, *Qualitas*, is defined by Mr. Locke to be the power in a fubject of producing any idea in the mind: thus a fnow-ball having the power to produce in us the ideas of white, cold, and round, thefe powers, as they are in the fnow-ball, he calls qualities; and as they are fenfations, or perceptions, in our underftanding, he calls ideas. See IDEA.

QUANTITY, *Quantitas*, any thing capable of eftimation, or menfuration; or which, being compared with another thing of the fame kind, may be faid to be greater or lefs than it, equal or unequal to it.

Mathematicks is the fcience or doctrine of quantity, which being made up of parts, is capable of being made greater or lefs. It is increafed by addition, and diminifhed by fubtraction; which are therefore the two primary operations that relate to quantity. Hence it is faid that any quantity may be fuppofed to enter into algebraick computations two different ways, which have contrary effects, viz. either as an increment or as a decrement. See ADDITION and SUBTRACTION.

As addition and fubtraction are oppofite, or an increment is oppofite to a decrement, there is an analagous oppofition between the affections of quantities that are confidered in the mathematical fciences; as between excefs and defect, between the value of effects or money due to a man, and money due by him; a line drawn towards the right, and a line drawn towards the left; gravity, and levity; elevation above the horizon and depreffion below it. When two quantities equal in refpect of magnitude, but of thofe oppofite kinds, are joined together, and conceived to take place in the fame fubject, they deftroy each other's effect, and their amount is nothing. A power is fuftained by an equal power, acting on the fame body with a contrary direction, and neither have effect. When two unequal quantities of thofe oppofite qualities are joined in the fame fubject, the greater prevails by their difference; and when a greater quantity is taken from a lefs of the fame kind, the remainder becomes of the oppofite kind. When two powers or forces are to be added together, their fum acts upon the body; but when we are to fubtract one of them from the other, we conceive that which is to be fubtracted, to be a power with an oppofite direction; and if it be greater than the other, it will prevail by the difference. This change of quality only takes place where the quantity is of fuch a nature as to admit of fuch a contrariety or oppofition. We know nothing analagous to it in quantity abftractedly confidered; and cannot fubtract a greater quantity of matter from a lefs, or a greater quantity of light from a lefs; and the application of this doctrine to any art or fcience, is to be derived from the known principles of the fcience.

A quantity that is to be added, is called a pofitive quantity; and a quantity to be fubtracted, is faid to be negative.

Quantities are faid to be like or fimilar, that are of the fame denomination, or are reprefented by the fame letter or letters, equally repeated: but quantities of different denominations, or reprefented by a different letter or letters, are faid to be unlike or diffimilar. A quantity confifting of more than one term, is called a compound quantity; whereas that confifting of one term only, is denominated a fimple quantity.

The quantity of matter in any body, is the product of its denfity into its bulk; or a quantity arifing from the joint confideration of its magnitude and denfity; as if a body be twice as denfe, and take up twice as much fpace as another, it will be four times as great. This quantity of matter is beft difcoverable by the abfolute weight of bodies.

The quantity of motion in any body is the factum of the velocity into the mafs, or it is a meafure arifing from the joint confideration of the quantity of matter, and the velocity of the motion of a body; the motion of any whole being the fum or aggregate of the motion in all its feveral parts. Hence, in a body twice as great as another, moved with an equal velocity, the quantity of motion is double; if the velocity be double alfo, the quantity of motion will be quadruple. Hence, the quantity of motion is the fame with what we call the momentum or impetus of a moving body.

QUANTITY, in grammar, an affection of a fyllable, whereby its meafure, or the time wherein it is produced, is afcertained; or that which determines the fyllable to be long or fhort.

Quantity is alfo the object of profody, and diftinguifhes verfe from profe; and the œconomy and arrangement of quantities, that is, the diftribution of long and fhort fyllables, makes what we call the number.

QUARANTAIN, QUARENTINE, or QUARANTENA, in old law books, denotes the fpace of 40 days. It alfo fignifies a benefit allowed to the widow of a man dying feifed of lands, &c. by which fhe may challenge to continue in his capital meffuage, or chief manfion-houfe, fo it be not a caftle, for the fpace of 40 days after his deceafe. And if the heir of any other perfon eject her, fhe may have the writ de quarantena habenda.

QUARANTAIN is more particularly ufed for a term of 40 days, which veffels, coming from places fufpected of contagion, are obliged to wait in certain places appointed to air themfelves, before they come into port. See LAZARETTO. Quarantain alfo fignifies a meafure or extent of land, containing 40 perches.

QUARANTAIN *of the King*, in France, denotes a truce of 40 days, appointed by St. Louis, during which it was expreffly forbid to take revenge on the relations or friends of people who had fought, wounded, or affronted each other in words.

QUARREL, *Querela*, in law, is generally applied to perfonal and mixed actions, in which the plaintiff is called querens: and hence it is, that if a perfon releafe all quarrels, it is taken to be as beneficial to the releafee, as if it were a releafe of all actions; fince all actions, both real and perfonal, are thereby releafed.

QUARRY, a place under ground, out of which are got marble, free-ftone, flate, lime-ftone, or other matters proper for buildings.

Quarries of free-ftone are in many places opened, and the ftone brought out in the following manner: they firft dig a hole in the manner of a well, 12 or 14 feet in diameter, and the rubbifh drawn out with a windlafs in large ofier bafkets, they heap up all around; placing their wheel, which is to draw up their ftones, upon it. As the hole advances, and the common ladder becomes too fhort, they apply a particular ladder for the purpofe. When they have got through the earth, and are arrived

at the firft bank or ftratum, they begin to apply their wheel and bafkets to difcharge the ftones as faft as they dig through them. In freeing the ftone from the bed, they proceed thus: as common ftones, at leaft the fofter kinds, have two grains, a cleaving grain, running parallel with the horizon, and a breaking grain, running perpendicular thereto; they obferve by the grain where it will cleave, and there drive in a number of wedges, till they have cleft it from the reft of the rock. This done, they proceed to break it; in order to which, applying the ruler to it, they ftrike a line, and by this cut a little channel with their ftone-axe; and in the channel, if the ftone be three or four feet long, fet five or fix wedges, driving them in very carefully with gentle blows, and ftill keeping them equally forward. Having thus broken the ftone in length, which they are able to do of any fize within half an inch, they apply a fquare to the ftraight fide, ftrike a line, and proceed to break it in breadth. This way of managing ftone is found vaftly preferable to that where they are broken at random; one load of the former being found to do the bufinefs of a load and a half of the latter. But it may be obferved, that this cleaving grain being generally wanting in the harder kinds of ftones, to break up thefe in the quarries, they have great heavy ftone-axes, with which they work down a deep channel into the ftone; and into this channel, at the top, lay two iron bars, between which they drive their iron wedges.

Some in dividing the ftone, efpecially the very hard kinds, make ufe of gunpowder, with very good effect. In order to which, making a fmall perforation pretty deep in the body of the rock, fo as to have that thicknefs of rock over it judged proper to be blown up at once, at the further end of the perforation they difpofe a convenient quantity of gunpowder, filling up all the reft with ftones and rubbifh, ftrongly rammed in, except a fmall place for the train. By this means is the rock blown into feveral pieces, moft of which are not too big to be managed by the workmen.

QUARRY, among glaziers, a pane of glafs cut in a diamond form. Quarries are of two kinds, fquare and long, each of which are of different fizes, expreffed by the number of the pieces that make a foot of glafs, viz. 8ths, 10ths, 12ths, 18ths, and 20ths.

QUARRY, in falconry, is the game which the hawk is in purfuit of, or has killed.

QUART, a meafure containing the fourth part of fome other meafure. The Englifh quart is the fourth part of a gallon, or two pints.

QUARTAN, *Quartana*, in medicine, a fpecies of intermitting fever, wherein the patient has two fits in four days, or two days quite free from a fit.

It ufually begins about four or five in the afternoon, fometimes fooner and fometimes later, with a great laffitude, ftretching, a blunt pain in the head, back, loins, and legs; and the feet and hands are cold, and the whole body is pale; and the face and nails livid, to which fhivering and fhaking fupervene. The tongue and the lips tremble, the breathing is difficult, with reftleffnefs, and toffing; the pulfe is contracted and hard, and fometimes unequal; and there is an anxiety about the præcordia. Thefe fymptoms continue about two or three hours; and in fome the body is coftive, whereas in others there is a ftimulus to ftool, and to make water: in fome again, there is a naufea or vomiting, with ftools; and fome advanced in years have their minds pretty much difturbed. The heat comes on gradually, not burning but dry; the pulfe becomes equal, quick, and large, but the dull pain in the head remains, with a vertiginous affection; the fkin becomes only a little moift; and in about four or fix hours, the fymptoms vanifh, except a dull pain in the bones, joints, and feet. The urine in the fit is fometimes thin and watery, and fometimes thick with a fediment.

From the experiments of Dr. Langrifh it appears, that the blood is more denfe and tenacious in quotidians than in tertians, and in tertians than in quartans.

As to the cure, a vomit fhould be given after the firft fit, in the time of intermiffion: in tender conftitutions, ipecacuanha may be given alone, or two ounces of vinum ipecacuanhum; but to the robuft, a grain or two of emetick tartar may be added, to be taken in warm water about two hours after the paroxyfm. The evacuation fhould be facilitated by taking large draughts of water-gruel made fat with frefh butter. Then take the following electuary, which will crufh the difeafe in the bud: viz. take of rob of elder, one ounce; of Peruvian bark, five drachms; of the powder of common chammomile-flowers, two drachms; of the extract of lefs centaury, and powder of clove-julyflowers, each half a drachm, and as much fyrup of lemons as is fufficient to reduce them to the form of an electuary. The dofe is half a drachm, to be taken every two hours after the fit.

If any thing forbids vomiting, the cure muft be begun with deterfive and aperient falts, as vitriolated tartar, falt armoniack, purified nitre, and crab's eyes; and if the ague ftill continue, notwithftanding the repeated ufe of thefe falts, then an equal weight of Peruvian bark muft be added to them, or the above electuary may be given.

When the patient is fubject to the hypochondriack paffion, the ftomach is inflated, and the body coftive; then neither vomits nor falts muft be ventured upon, but carminitive and emollient clyfters.

In obftinate quartans, Hoffman greatly commends the following medicine: take of Peruvian bark, three drachms; of medicinal regulus of antimony, two drachms; of mercurius dulcis, (which is not to be triturated with the powder on account of the falts, but only mixed with the point of a knife) of the fineft crocus martis, and of vitriolated nitre, each one drachm: and of oil of mint, four drops: make up all thefe into a powder, of which half a drachm, or a drachm, may be taken, made into the form of a bolus, with rob of elder, and fyrup of clove-julyflowers.

This method is confirmed by Huxham, who fays the bark frequently proves ineffectual, without the help of proper alexipharmicks; as fnake-root of Virginia, contrayerva, myrrh, camphor, &c. After four or five paroxyfms, warm chalybeates may be added with very great fuccefs; but when the patient's complexion has a yellow caft, and he has a tenfe abdomen, and a very coftive habit of body, mercurial, faponaceous deobftruents, with rhubarb, aloeticks, or fal diureticus fhould be premifed to, or joined with the bark. Hoffman obferves, that obftinate quartans in boys are not to be cured but by purging; and therefore, he directs the following form: take of cream of tartar, one drachm; of calx of antimony, 12 grains; of fulphurated diagrydium, fix grains; make them into a powder, which may be taken in three dofes, the firft fix hours before the fit, the fecond before the next fit, and the third before the third fit. After this, he orders an infufion of half an ounce of Peruvian bark in eight ounces of fennel-water; adding the bark of Eleutherius, fal diureticus, and falt of tartar, of each one drachm, together with half an ounce of fyrup of clove-julyflowers, a fpoonful of which fhould be taken every two hours.

To prevent the return of an ague, the bark muft be repeated every week or 10 days, for three feveral times, with the fame intervals. Likewife bitters and chalybeates are very ferviceable, taken either together or feparately.

QUARTATION, in metallurgy, a method of purifying gold, by melting three parts of filver with one of gold, and then throwing the mixture into aqua fortis.

QUARTER, *Quadrans*, the fourth part of any thing, the fractional expreffion for which is $\frac{1}{4}$. See the article FRACTION.

QUARTER, in weights, is generally ufed for the fourth part of 100 wt. averdupois, or 28 lb. Ufed as the name of a dry meafure, quarter is the fourth part of a ton in weight, or eight bufhels.

QUARTER, in law, the fourth part of a year; and hence the days on which thefe quarters commence, are called quarter-days, viz. March 25, or Lady-day; June 24, or Midfummer-day; September 29, or Michaelmas; and December 21, or St. Thomas the apoftle's day. On thefe days rents on leafes, &c. are ufually referved to be paid; though December 25, or Chriftmas-day, is commonly reckoned the laft quarter-day.

QUARTER, in aftronomy, the fourth part of the moon's period: thus, from the new moon to the quadrature is the firft quarter; from this to full moon, the fecond quarter, &c.

QUARTER, in heraldry, is applied to the parts or members of the firft divifion of a coat that is quartered, or divided into four quarters. See QUARTERING.

Franck-QUARTER, in heraldry, is a quarter single or alone; which is to possess one fourth part of the field. This makes one of the honourable ordinaries of a coat.

QUARTER *of a Point*, in navigation, is the fourth part of the distance between two cardinal points, which is 2° 48′.

QUARTER of a ship, is that part of a ship's hold, which lies between the steerage-room and the transom.

Close QUARTERS, in a ship, those places where the seamen quarter themselves, in case of boarding, for their own defence, and for clearing the decks, &c.

QUARTER-*Master*, an officer in the army, whose business is to look after the quarters of the soldiers; of which there are several kinds, viz. the quarter-master-general, whose business is to provide good quarters for the whole army. Quarter-master of horse, he who is to provide quarters for a troop of horse. Quarter-master of foot, he who is to provide quarters for a regiment of foot.

QUARTER-MASTERS, or QUARTEERS, in a man of war, are officers whose business is to rummage, stow, and trim the ship in the hold; to overlook the steward in his delivery of victuals to the cook, and in pumping or drawing out beer, or the like. They are also to keep their watch duly, in conning the ship, or any other duty.

QUARTER, in war, is used in various senses, as for the place allotted to a body of troops to encamp upon: thus they say, the general has extended his quarters a great way, &c. Quarter also signifies the sparing mens lives: thus it is said, the enemy asked quarter: we gave no quarter.

QUARTER *of an Assembly*, is the place of rendezvous, where the troops are to meet and draw up in a body.

Head-QUARTERS, is the place where the general of an army has his quarters, which is generally near the centre of the army.

QUARTERS *of Refreshment*, is the place to which the troops that have been much fatigued are sent to refresh themselves, during a part of the campaign.

Winter-QUARTERS, the places in which the troops are lodged during the winter, or their residence in those places.

QUARTER, in the menage, as to work from quarter to quarter, is to ride a horse three times in upon the first of the four lines of a square; then changing your hand, to ride him three times upon the second; and so to third and fourth; always changing hands and observing the same order.

QUARTER-*Chord*, in mining, is seven yards and a quarter, which the miner has cross-ways of his vein, on either side, for liberty to lay his earth, stones, and rubbish on, and to wash and dress up his ore.

QUARTERS, in building, are those slight upright pieces of timber placed between the puncheons and posts, used to lath upon. These are of two sorts, single and double; the single quarters are sawn to two inches thick, and four inches broad; the double quarters are sawn to four inches square. It is a rule in carpentry, that no quarters be placed at a greater distance than 14 inches.

QUARTER-*Round*, in architecture, is a term used by the workmen for any projecting moulding in general, whose contour is a perfect quadrant of a circle, or which approaches near that figure.

QUARTER-*Wheeling*, or QUARTER *of Conversion*, in the military art, is the motion by which the front of a body of men is turned round to where the flank was, by taking a quarter of a circle. If it be done to the right, the man in the right-hand angle keeps his ground and faces about, while the rest wheel; if to the left, the left-hand man keeps his place.

QUARTER-*Wind*, at sea, is a lateral or side-wind, which does not blow in stern, but a little aside of it. This is the best of all winds, as bearing into all the sails; whereas a wind blowing full in stern, is kept off by the sails of the mizen.

QUARTERING, in the sea-language, is disposing the ship's company at an engagement, in such a manner as that each may readily know where his station is, and what he is to do. As some to the master for the management of the sails; some to assist the gunners in traversing the ordnance; some for plying of the small shot; some to fill powder in the powder-room; others to carry it from thence to the gunners, in cartridges, &c. When a ship under sail goes at large, neither by a wind nor before a wind, but, as it were, betwixt both, she is said to go quartering.

QUARTERING, in gunnery, is when a piece of ordnance is so traversed that it will shoot on the same line, or on the same point of the compass as the ship's quarter bears.

QUARTERING, in heraldry, is dividing a coat into four or more quarters, or quarterings, by parting, couping, &c. that is, by perpendicular and horizontal lines, &c.

Counter-QUARTERING *a Coat*, is when the quarters are subdivided each into four. There are counter-quartered coats that have 20 or 25 quarters.

QUARTERING, or QUARTERIZATION, is part of the punishment of a traitor, which consists of dividing his body into four quarters.

QUARTERLY, in heraldry; a person is said to bear quarterly, when he bears arms quartered.

QUARTERN, a diminutive of quart, signifying a quarter of a pint.

QUARTER-COUSINS, fourth cousins, or the last degree of kindred.

QUARTILE, an aspect of the planets. See ASPECT.

QUARTO, or 4to, a book of which four leaves, or eight pages, make a sheet.

QUARTO-DECIMANS, *Quarto-decimani*, an ancient Christian sect, so called from their maintaining that the festival of Easter ought to be celebrated, conformably to the custom of the Jews, on the 14th day of the moon in the month of March, whatever day of the week that happened to be.

QUASHING, in law, the overthrowing or annulling of any thing.

QUAVER, in musick, a measure of time equal to half a crotchet, or ⅛th of a semibreve. The quaver is divided into two semiquavers, and four demisemiquavers.

QUAVERING, in musick, trilling or shaking; or the running a division with the voice.

QUEEN, *Regina*, a woman who holds a crown singly. The title of queen is also given by way of courtesy to her that is married to a king, who is called by way of distinction, queen consort; the former being termed queen regent. The widow of a king is also called queen; but with the addition of dowager.

QUERCUS, the oak-tree, in botany. See OAK.

QUESTION, *Quæstio*, in logick, a proposition proposed by way of interrogation.

QUESTOR, or QUÆSTOR, in Roman antiquity, an officer who had the management of the publick treasure.

QUEUE, in heraldry, signifies the tail of a beast: thus if a lion be borne with a forked tail, he is blazoned double queued.

QUEUE D'ARONDE, or SWALLOW'S TAIL, in fortification, an outwork which is narrower at the gorge than at the front or face, being so called from its resemblance to a swallow's tail. Of this kind are some single as well as double tenailles, and some horn-works whose sides are not parallel. When the front is narrower than the gorge, the work is denominated a contre queue d'aronde.

In carpentry, a queue d'aronde is more generally known by the name of dove-tail.

QUICK, or QUICKSET, among gardeners, the hawthorn, or mespilus sylvestris, much used for hedges, it being very proper for that purpose. In the choice of quick, those which are raised from seeds in the nursery are preferable to such as are drawn from the woods, the latter seldom arising with good roots; but to have the best quick fence, it is most eligible to sow the haws where the hedge is intended; for these unremoved plants will make a much stronger and more durable fence than those which are transplanted; but they should be properly weeded when young, and protected from being injured by cattle, &c. When quick is grown rude, and bare at bottom, it may be necessary to plash it; of which method there are two extremes to be avoided; the first is, laying it too low and too thick; because it makes the sap run all into the shoots, and leaves the plashes without nourishment, which, with the thickness of the hedge, kill them: secondly, it must not be laid too high, because this draws all the sap into the plashes, and so causes but small shoots at the bottom, so that the hedge is still thin, without answering the intention of plash-

ing. When the ſhoot that is deſigned to be plaſhed is bent, there is generally given a ſmall cut to it half way through, and ſloping a little downward, then it is wove about the ſtakes, and trimmed of its ſtraggling ſuperfluous branches.

QUICK-SILVER, in natural hiſtory, a ponderous mineral fluid, more uſually called mercury. See MERCURY.

QUIESCENT, ſomething at reſt, in contradiſtinction to motion.

QUIETISTS, a religious ſect, which made a great noiſe towards the cloſe of the laſt century.

They were ſo called from a kind of abſolute reſt and inaction, which they ſuppoſed the ſoul to be in when arrived at the ſtate of perfection which they called the unitive life; in which ſtate they imagined the ſoul wholly employed in contemplating its God, to whoſe influence it was entirely ſubmiſſive, ſo that he could turn and drive it where and how he would. In this ſtate, the ſoul no longer needs prayers, hymns, &c. being laid, as it were, in the boſom, and between the arms of its God, in whom it is in a manner ſwallowed up.

QUILLS, the large feathers taken out of the end of the wing of a gooſe, crow, &c. Quills are denominated from the order in which they are fixed in the wing, the ſecond and third quills being the beſt for writing, as they have the largeſt and roundeſt barrels.

QUILTING, a method of ſewing two pieces of ſilk, linen, or ſtuff, on each other, with wool or cotton between them; by working them all over in the form of chequer or diamond-work, or in flowers. The ſame name is alſo given to the ſtuff ſo worked.

QUINARIUS, in Roman antiquity, a ſmall coin equal to half the denarius.

QUINCE, *Cydonia*, in botany, a well known genus of trees, comprehended by Linnæus among the pyrus or pear-tree, which, according to his ſyſtem of botany, it agrees with, in reſpect of its generical characters. According to Pliny, it received the name of malus cydonia from Cydone, a town in Crete, from whence it is ſaid to have been firſt brought into Italy. When quinces are unripe, they are ſeldom or never eaten, eſpecially raw, as they are very rough and aſtringent; they mightily cool and ſtrengthen the ſtomach, remove nauſeas, and ſtop fluxes of the belly; for theſe purpoſes they are much in uſe, eſpecially their juice made into a ſyrup, which is both pleaſant and agreeably aſtringent. The ſeeds bruiſed well with an aqueous liquor afford a good mucilage, which is excellent in ſome ſoreneſſes of the mouth and gums.

QUINCUNX, in Roman antiquity, denotes any thing that conſiſts of five twelfth parts of another, but particularly of the as.

QUINCUNX ORDER, in gardening, a plantation of trees, diſpoſed originally in a ſquare; and conſiſting of five trees, one at each corner, and a fifth in the middle: or a quincunx is the figure of a plantation of trees, diſpoſed in ſeveral rows, both length and breadthwiſe, in ſuch a manner, that the firſt tree in the ſecond row commences in the centre of the ſquare formed by the two firſt trees in the firſt row, and the two firſt in the third, reſembling the figure of the five at cards. This diſpoſition of trees was formerly much more regarded than at preſent; but is ſtill much uſed in France, for planting trees to form a grove.

QUINDECAGON, in geometry, a plain figure with 15 ſides and 15 angles; which, if the ſides be all equal, is termed a regular quindecagon, and irregular when otherwiſe. The ſide of a regular quindecagon inſcribed in a circle, is equal in power to the half difference between the ſide of the equilateral triangle, and the ſide of the pentagon, inſcribed in the ſame circle; alſo the difference of the perpendiculars let fall on both ſides, taken together.

QUINDECEMVIRI, in Roman antiquity, a college of 15 magiſtrates, whoſe buſineſs it was to preſide over the ſacrifices. They were the interpreters of the Sibyl's books; which, however, they never conſulted but by an expreſs order of the ſenate.

QUINQUAGESIMA SUNDAY, Shrove Sunday, ſo called as being the 50th day before Eaſter.

QUINQUINA, in pharmacy, the ſame with the Peruvian or Jeſuit's bark; the tree which produces it is called by Linnæus cinhona.

The Peruvian bark ſhould be choſen freſh, and of a bright colour, approaching to that of cinnamon, and of a ſtrong taſte. The ſmaller pieces, in quills, are generally the beſt; the larger and flatter fragments having leſs virtue. We ſometimes meet with it cut into thin ſlices, and of a yellower colour than ordinary; this is the bark of the root, has a very ſtrong taſte, and is eſteemed by the Spaniards the choiceſt of all.

The Peruvian bark poſſeſſes the ſtomachick virtues of the other bitters, and that in ſo eminent a degree, that it is a queſtion whether any of the ſtomachicks are equal to it: it ſtrengthens the ſtomach, promotes the appetite, and aſſiſts digeſtion; it diſſipates flatulencies, and is a very good medicince againſt worms. Its great virtue, however, is as a febrifuge: it cures all intermittents ſafely and ſpeedily, if properly given. Its febrifuge virtue was diſcovered to us by the Indians, among whom it had been many ages known, and firſt diſcovered by a perſon's being cured of an intermittent, by drinking the water of a pond, where ſome trees of it had accidentally fallen. It was not diſcovered to any body in this part of the world till 1640, when a Spaniard, the governor of the city of Loxa, who had behaved well to ſome of theſe people, had the diſcovery as a reward. With the new medicine he cured the viceroy's lady of a tertian, after ſhe had tried every thing elſe in vain. Hence it was called the counteſs's powder.

After this, the Jeſuits brought over a vaſt quantity, which was in 1694, diſtributed all over Europe, and did great cures. It was then called pulvis patrum, and Jeſuit's powder: and the cardinal de Lugo having bought up a vaſt quantity of it for the poor and others, it was afterwards called cardinal Lugo

Notwithſtanding the ſucceſs of this new febrifuge, whenever given properly, there were many of the phyſicians at that time, who were ſcrupulous of uſing it, as ſuſpecting it could not be ſafe to carry off ſuch a diſeaſe ſo ſpeedily, and without evacuations: but a long and happy experience of it has taught us, that it is one of the greateſt, and, in prudent hands, one of the ſafeſt medicines in the world. It is given in powder from a ſcruple to a drachm for a doſe. We have a ſimple, a volatile tincture, and an extract of it in the ſhops.

QUINSEY, or QUINZY. See QUINZY.

QUINTAL, in commerce, the ſame with 100 wt.

QUINTESSENCE, *Quinta Eſſentia*, in chymiſtry, a preparation conſiſting of the eſſential oil of ſome vegetable ſubſtance mixed and incorporated with ſpirit of wine.

QUINTILE, *Quintilis*, in aſtronomy, an aſpect of the planets, when they are 72° diſtant from one to another, or a fifth part of the zodiack.

QUINTILLIANS, a ſect of ancient hereticks, thus called from their propheteſs Quintilia. In this ſect the women were admitted to perform the ſacerdotal and epiſcopal functions. They attributed extraordinary gifts to Eve for having firſt eaten of the tree of knowledge; told great things of Mary the ſiſter of Moſes, as having been a propheteſs, &c. They added, that Philip the deacon had four daughters, who were all propheteſſes, and were of their ſect. In theſe aſſemblies it was uſual to ſee the virgins entering in white robes, perſonating propheteſſes.

QUINZY, QUINSEY, or ANGINA, in medicine, a pain and inflammation of the fauces, a ſwelling of the uvula, tonſils, and larynx, which being accompanied by a fever, occaſions a difficulty of reſpiration and deglutition. "This diſeaſe generally prevails about the latter end of ſpring or beginning of ſummer. When the ſwelling, pain, and redneſs, appear moſtly on the outſides, it is, according to Hoffman, the prognoſtick of a happy ſolution of the diſeaſe: but when the external ſwelling ſuddenly diſappears, without a mitigation of the ſymptoms, it ſhews the morbifick matter to be tranſlated elſewhere, and that the diſeaſe will change to a phrenzy, or peripneumony. This diſeaſe may alſo terminate in a ſuppuration, gangrene, or ſchirrus. A frothing at the mouth, the tongue vaſtly ſwelled, and of a purple blackiſh colour, portend death."

QUIRE *of Paper*, is 24 or 25 ſheets.

QUIRK, in building, a piece of ground taken out of the corner of any regular ground-plat or floor, to make a court or yard.

QUIT-RENT, *Quiet-rent*, a certain ſmall rent payable yearly by the tenants of moſt manors in token of ſubjection;

ſubjection; upon the payment whereof they are quiet and free.

QUITTER-Bone, among farriers, a hard round ſwelling upon the coronet of a horſe's foot, or between the heel and the quarter. It is occaſioned by gravel under the ſhoe, by a bruiſe, ſtab, prick of a nail, peccant humours deſcending to that place, blow, ſtrain, over-reach, &c. With it the horſe halts much, and the ſwelling grows viſible, and comes to a head in four or five days, and breaks out at a little deep hole like a fiſtula.

QUOD *Clerici non eligantur in Officio*, in law, is a writ that lies for a clerk, who by reaſon of ſome land that he hath, is made or like to be made a bailiff, beadle, reeve, &c,

Quod *Perſona nec Præbendarii*, &c. in law, a writ that lies for ſpiritual perſons, when diſtrained in their ſpiritual poſſeſſions, for the payment of a 15th, with the reſt of the pariſh.

QUODLIBETICAL Question, *Quæſtio quodlibetica*, a problem, anciently propoſed to be debated in the ſchools, out of curioſity and entertainment, rather than for the ſettling of any uſeful point.

QUOIL, *Quoyl*, *Coile*, in the ſea-language, denotes when a cable is laid round in a ring, one turn over another, on the deck of a ſhip.

QUOIN, *Coin*, on board a ſhip, is a wedge faſtened on the deck, cloſe to the breech of the carriage of a gun, to keep it firm up to the ſhip's ſide, and prevent its rolling.

Quoins, in architecture, denote the corners of brick or ſtone-walls. It particularly denotes the ſtones in the corners of brick-buildings. When they ſtand out beyond the brick-work, their edges being chamfered off, they are called ruſtick quoins.

QUOITS, a kind of exerciſe, known among the ancients under the name of diſcus.

QUO Jure, in law, a writ that lies for him who has lands, wherein another challengeth common of paſture time out of mind, whereby the party is compelled to ſhew by what right he challenges this privilege.

Quo *Minus*, in law, is alſo a writ that lies for the king's farmer or debtor in the court of Exchequer, againſt him to whom he ſelleth any thing touching his farm; or againſt whom he hath any cauſe of perſonal action: for that, by the vendee's detaining any due from him, the farmer is made leſs able to pay the king's rent.

It is alſo a writ that lies for him who has a grant of houſe-bote (or a privilege of having timber out of the lord's wood for the repair of a tenement) in another perſon's wood, againſt the granter making ſuch waſte, as that the grantee cannot enjoy his grant.

QUORUM, in law, is one or more juſtices of the peace without whom the reſt of the juſtices in ſome caſes cannot proceed. It is thus called from the words in the commiſſion, namely, *quorum* A. B. *unum eſſe volumus*.

QUOTATION, in literature, a citation, or paſſage expreſſly rehearſed or taken from any author; which is uſually diſtinguiſhed by one or two inverted commas, (') ('').

Quoting by book, and chapter or ſection, ought only to obtain where the whole chapter or ſection is expreſſly on the ſubject: on other occaſions quoting by page is more commodious, except where there are different editions of an author, as in the claſſicks, &c. unleſs the edition be alſo ſpecified.

QUOTIDIAN Fever, *Febris Quotidiana*, in medicine, an intermitting fever or ague, which ſeizes and terminates every day, with a ſubſequent intermiſſion for the ſpace of ſome hours. See Ague.

QUOTIENT, *Quotiens*, in arithmetick, the number reſulting from the diviſion of a greater number by a ſmaller, and which ſhews how often the ſmaller or the diviſor is contained in the greater or dividend.

QUO Warranto, in law, a writ that lies againſt a perſon, or corporation, who uſurp any franchiſe againſt the king; ſuch as to have waife, ſtray, fair, &c. without a good title.

It alſo lies for miſ-uſer or non-uſer of privileges granted. And even, according to Bracton, againſt him that intrudes himſelf as heir to lands.

R.

R, A liquid conſonant, being the 17th letter of our alphabet. Its ſound is formed by a guttural extruſion of the breath, vibrated through the mouth, with a ſort of quivering motion of the tongue drawn from the teeth, and cannulated, with the tip a little elevated towards the palate.

Uſed as a numeral, R anciently ſtood for 80, and with a daſh over it, thus $\bar{R}$, for 80,000; but the Greek *r*, or *ρ*, ſignified 100.

In the preſcriptions of phyſicians, R or ℞ ſtands for recipe, i. e. take.

RABBETING, in carpentry, the planning or cutting of channels or grooves in boards, &c.

In ſhip-carpentry, it ſignifies the letting in of the planks of the ſhip into the keel; which, in the rake and run of a ſhip, is hollowed away, that the planks may join cloſer.

RABBI, or Rabbins, a title which the Phariſees and doctors of the law, among the Jews, aſſumed, and literally ſignified maſters or excellents.

There were ſeveral gradations before they arrived at the dignity of a rabbin, which was not conferred till they had acquired the profoundeſt knowledge of the law and the traditions. However, it does not appear that there was any fixed age, or previous examination neceſſary; but when a man had diſtinguiſhed himſelf by his ſkill in the written and oral law, and paſſed through the ſubordinate degrees, he was ſaluted a rabbin by the publick voice.

Among the modern Jews, for near 700 years paſt, the learned men retain no other title than that of rabbi, or rabbins: they have great reſpect paid them, have the firſt places or ſeats in their ſynagogues, determine all matters of controverſy, and frequently pronounce upon civil affairs: they have even a power to excommunicate the diſobedient.

RABBINET, a ſmall piece of ordnance, between a falconet and a baſe. See Cannon.

RABBINISTS, among the modern Jews, an appellation given to the doctrine of the rabbins concerning traditions, in oppoſition to the caraites, who reject all traditions. See Caraites.

RABBIT, *Cuniculus*, in zoology, a well known animal of the lepus or hare kind, with a very ſhort tail.

RACEMUS, among botaniſts, ſignifies a cluſter or ſtalk, divided or branched into ſeveral footſtalks, ſuſtaining the flowers or fruits ſet together; ſuch are the bunches of grapes, currants, &c. racemus anciently ſignifying a bunch of grapes.

RACK, an engine of torture, furniſhed with pullies and cords, &c. for extorting confeſſion from criminals.

Rack, a ſpirituous liquor. See Arrack.

RADIAL Curves, are curves of the ſpiral kind, whoſe ordinates, if they may be ſo called, all terminate in the centre of the including circle, appearing like radii of that circle; whence the name. See Curve and Spiral.

RADIALIS, or Radiæus, in anatomy, the name of

of two muſcles of the arm; one of which, called radialis internus, is one of the three flexor muſcles of the carpus, or hand, which ariſing from the internal condyle of the humerus, is inſerted into the bone of the carpus next the thumb; and the other, called radialis externus, is one of the three extenſor muſcles of the hand, which ariſing from the external condyle of the humerus, is inſerted into the firſt metacarpal bone.

RADIANT, or RADIATING POINT, in opticks, is any point of a viſible object from whence rays proceed.

RADIATED FLOWERS, in botany, are ſuch as have ſeveral ſemi-florets ſet round the diſck, in form of a radiant ſtar; and are either ligulate, as in the aſter; tubuloſe, as in the centaury; or naked, as in the artemeſia.

RADIATED, is alſo uſed with reſpect to one of the ancient crowns. See CROWN.

RADICAL, in general, ſomething that ſerves as a baſis or foundation. Hence phyſicians talk much of a radical moiſture. See MOISTURE.

In grammar, we give the appellation radical to primitive words, in contradiſtinction to compounds and derivatives.

Algebraiſts alſo ſpeak of the radical ſign of quantities, which is the character expreſſing their roots. See ROOT and CHARACTER.

RADICATION, a term uſed by ſome for the action whereby plants take root, or ſhoot out roots. See ROOT and VEGETATION.

RADICLE, that part of the ſeeds of all plants, which upon vegetating become its root, and is diſcoverable by the microſcope. See VEGETATION.

RADISH, *Raphanus*, in botany, a genus of plants, whoſe flower is tetrapetalous and cruciform; the fruit is an oblong, ſmooth, ſpongy pod, having an acute point, ſwelling and almoſt jointed, and containing ſeveral ſmooth roundiſh ſeeds. There are ſeveral ſorts of radiſhes, as the common purple-rooted radiſh, the ſalmon radiſh, the turnep-rooted radiſh, the black Spaniſh radiſh, &c. they are all propagated by ſowing their ſeeds. The firſt and ſecond ſorts are cultivated in great quantities, for the ſupply of the London markets.

Radiſhes abound with a penetrating nitrous juice, which makes them diuretick, and cleanſing to the inteſtines and viſcera: they have ſomewhat alſo in their outward ſkin which is hot and biting, both which qualities help to make them a good antiſcorbutick: they agree very well with moſt conſtitutions, provided they have good ſtomachs; and the juice is ſaid to be good in the gravel, if four ounces of it be taken for four days in a morning faſting.

Horſe-RADISH. See HORSE-*Radiſh*.

RADIUS, in geometry, the ſemi-diameter of a circle, or a right-line drawn from the centre to the circumference. See CIRCLE.

In trigonometry, the radius is termed the whole ſine, or ſine of 90°. See SINE.

RADIUS, in anatomy, the exterior bone of the arm, deſcending along with the ulna from the elbow to the wriſt. In its upper extremity there is a glenoid cavity for its articulation with the humerus; alſo a creſt, by means of which, it is articulated with the ulna: in the lower extremity the head is thicker, and of a more angular figure, with a very large hollow in the middle, for its articulation with the wriſt.

RADIX, the ſame with root. See ROOT.

RAFTERS, in building, are pieces of timber, which ſtanding by pairs on the reaſon or raiſing-piece, meet in an angle at the top, and form the roof of a building.

It is a rule in building, that no rafters ſhould ſtand further that 12 inches from one another: and as to their ſizes or ſcantlings, it is provided by act of parliament, that principal rafters, from 12 feet 6 inches to 14 feet 6 inches long, be 5 inches broad at the top, and 8 at the bottom, and 6 inches thick. Thoſe from 14 feet 6 inches, to 18 feet 6 inches long, to be 9 inches broad at the foot, 7 inches at the top, and 7 inches thick: and thoſe from 18 feet 6 inches, to 21 feet 6 inches long, to be 10 inches broad at the foot, 8 at the top, and 8 thick. Single rafters, 8 feet in length, muſt have 4 inches and a half, and 3 inches $\frac{1}{2}$ in their ſquare. Thoſe of 9 feet long muſt be 5 and 4 inches ſquare.

Principal rafters ſhould be nearly as thick at the bottom as the beam, and ſhould diminiſh in their length $\frac{1}{5}$ or $\frac{1}{6}$ of their breadth; the king-poſts ſhould be as thick as the principal rafters, and their breadth, according to the bigneſs of them that are intended to be let into them; the middle part being left ſomewhat broader than the thickneſs.

RAGWORT, *Jacobæa*, in botany, is comprehended by Linnæus with the ſenecio. See SENECIO.

RAGOUT, or RAGOO, a ſauce, or ſeaſoning, intended to rouſe the appetite when loſt or languiſhing. This term is alſo uſed for any high ſeaſoned diſh prepared of fleſh, fiſh, greens, or the like; by ſtewing them with bacon, ſalt, pepper, cloves, and the like ingredients.

RAGULED, or ragged, in heraldry, jagged or knotted. This term is applied to a croſs formed of the trunks of two trees without their branches, of which they ſhew only the ſtumps.

RAJA, the title of the Indian black princes, the remains of thoſe who ruled there before the moguls.

RAIL, in architecture, is uſed in different ſenſes, as for thoſe pieces of timber which lie horizontally between the pannels of wainſcot, and the like.

RAIN, a watery-meteor, which deſcends from the clouds in form of drops of water.

Rain is apparently the precipitated vapours of watery clouds: thus, when various congeries of clouds are driven together by the agitation of the winds, they mix and run into one body, and by that means diſſolve and condenſe each other into their former ſubſtance of water; alſo the coldneſs of the air is a great means to collect, compact, and condenſe clouds into water; which being heavier than the air, muſt of neceſſity fall through it in the form we call rain. Now the reaſon why it falls in drops, and not in whole quantities, as it becomes condenſed, is the reſiſtance of the air; whereby, being broken and divided into ſmaller and ſmaller parts, the further it paſſes through the air, it at laſt arrives to us in ſmall drops.

Mr. Derham accounts for the precipitation hence, that the veſiculæ being full of air, when they meet with a colder air than they contain, their air is contracted into a leſs ſpace; and, conſequently, the watery ſhell rendered thicker, ſo as to become heavier than the air, &c. Others only allow the cold a part in the action, and bring in the winds as ſharers with it: indeed, it is plain, that a wind, blowing againſt a cloud, will drive its veſiculæ upon one another, by which means ſeveral of them coaleſcing, will be enabled to deſcend; and the effect will be ſtill more conſiderable if two oppoſite winds blow towards the ſame place. Add to this, that clouds already formed, happening to be aggravated by freſh acceſſions of vapour continually aſcending, may thence be enabled to deſcend.

According to Rohault, the great cauſe of rain is the heat of the air, which after continuing for ſome time near the earth, is at length carried up on high by a wind, and there thawing the ſnowy villi, or flocks of the half-frozen veſiculæ, reduces them into drops; which coaleſcing, deſcend.

Others, as Dr. Clarke, &c. aſcribe this deſcent of the clouds rather to an alteration of the atmoſphere than of the veſiculæ; and ſuppoſe it to ariſe from a diminution of the elaſtick force of the air. This elaſticity, which depends chiefly or wholly on the terrene exhalations, being weakened, the atmoſphere ſinks under its burden, and the clouds fall. Now the little veſicles being once upon the deſcent, will perſiſt therein, notwithſtanding the increaſe of reſiſtance they every moment meet with. For as they all tend toward the centre of the earth, the further they fall, the more coalitions will they make; and the more coalitions, the more matter will there be under the ſame ſurface; the ſurface only increaſing as the ſquares, but the ſolidity as the cube; and the more matter under the ſame ſurface, the leſs reſiſtance there will be to the ſame matter. Thus, if the cold, wind, &c. act early enough to precipitate the aſcending veſicles, before they are arrived at any conſiderable height, the coalitions being but few, the drops will be proportionably ſmall; and thus is formed a dew. If the vapours be more copious, and riſe a little higher, we have a miſt or fog; a little higher ſtill, and they produce a ſmall rain, &c. If they neither meet with cold nor wind, they form a heavy, thick, dark ſky.

Hence many of the phænomena of the weather may be

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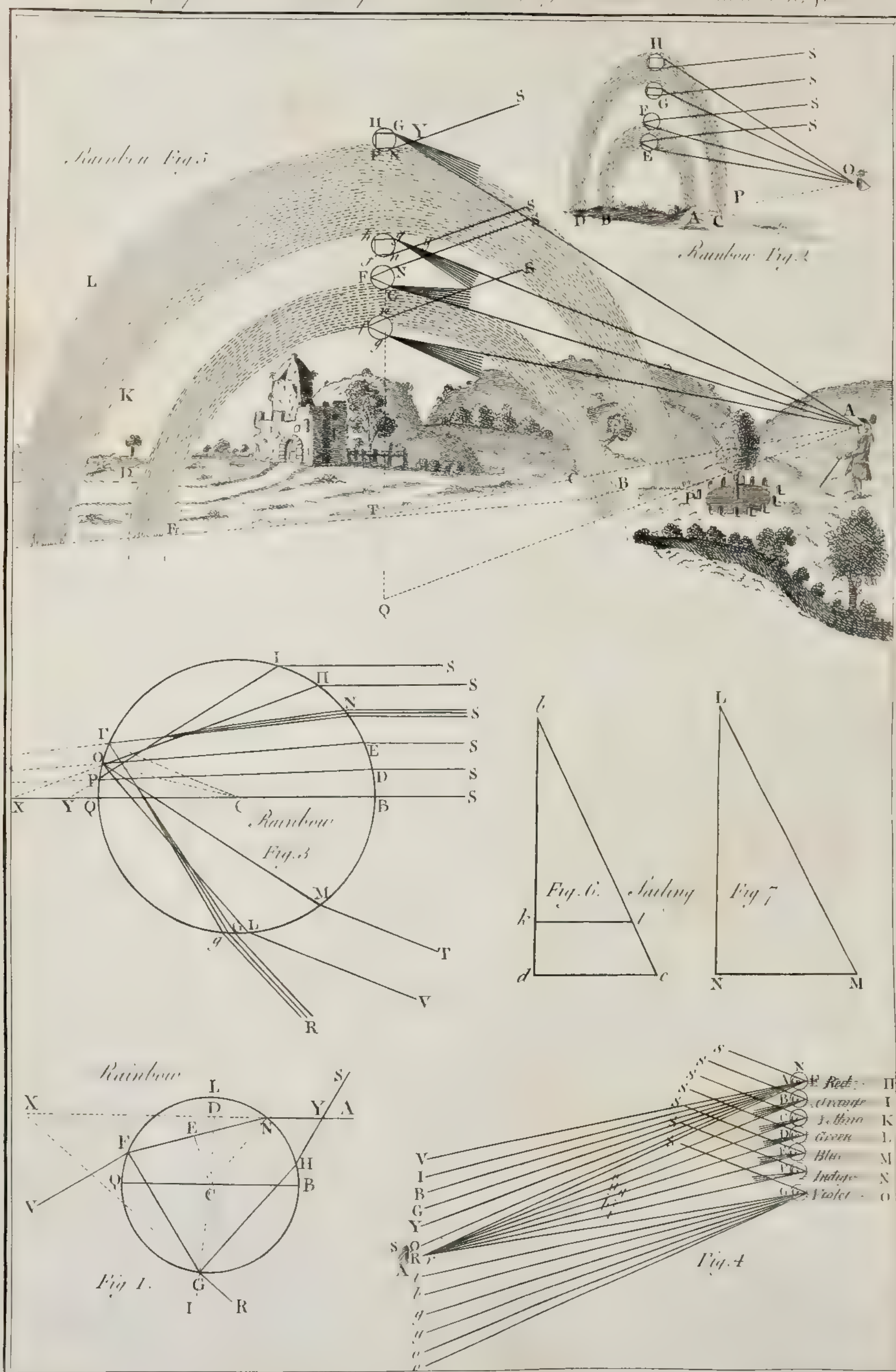

Plate LXXI

facing Rainbow.

be accounted for: as, why a cold fummer is always a wet one, and a warm a dry one; why we have commonly moft rain about the equinoxes; why a fettled, thick, clofe fky, fcarce ever rains till it have been firft clear; as to the quantity of rain that falls, its proportion in feveral places at the fame time, and in the fame place at feveral times, we have ftore of obfervations, journals, &c. in the Memoirs of the French Academy, Philofophical Tranfactions, &c.

Rains, in the fea language, all that tract of fea to the northward of the equator, between 4 and 10 degrees latitude, and lying between the meridian of Cape Verde, and that of the eafternmoft iflands of the fame name. It is fo called from the almoft continual calms, conftant rains, thunder and lightning found there.

RAINBOW, or Bow, *Iris*, a meteor, in form of a party-coloured femicircle, exhibited in a rainy fky oppofite to the fun, by the refraction of his rays in drops of falling rain.

There is, alfo, a fecondary bow which is fainter, ufually inverting the former at fome diftance.

The rainbow, Sir Ifaac Newton obferves, never appears but where it rains in the fun-fhine; and may be reprefented artificially, by contriving water to fall in little drops, like rain, through which the fun fhining, exhibits a bow to a fpectator placed between the fun and the drops; efpecially if a black cloth be difpofed beyond the drops.

Anton. de Dominis firft accounted for the rainbow in 1611, by refraction and reflexion of the fun-beams in fpherical drops of water; which he confirmed by experiments made with glafs-globes, &c. full of water; wherein he was followed by Des Cartes, who improved upon his account. But the Newtonian doctrine of colours fupplies and corrects their explications.

Theory of the Rainbow. Let B N F G (*plate* LXXI. *fig.* 1.) be a fpherical drop of falling rain, and A N a ray of the fun falling upon it in the point N, which ray fuppofe refracted to F, from thence reflected to G, and there again refracted in the direction G R to the eye of a fpectator; and let I G be perpendicular to the point G: then will the beam, by its refraction at G, be feparated into its feveral forts of rays, which will paint their refpective colours in that part of the drop, of which that next the perpendicular I G will be red, as being leaft refracted, and the reft, in order, above it. Now, it is found by computation, that the greateft angle S E O (*fig.* 2.) or E O P (drawing O P parallel to S E) under which the moft refrangible rays can come to the eye of a fpectator at O, is 40° 17′, and that the greateft angle F O P under which the leaft refrangible rays come to the eye at O, is 42° 2′. And fo all the particles of water within the difference of thofe two angles E F, will exhibit, feverally, the various colours of the prifm, and conftitute the interior bow in the cloud.

If the beam go not out of the drop at G (*fig.* 1.) but is reflected (a fecond time) to H, and is there refracted in the direction H S, making the angle S Y A with the incident ray A N, it will paint on the part H the feveral colours of light, but in an inverfe order to the former, and more faint, by reafon of the rays loft by the fecond reflection. It has been found, alfo, that the leaft angle S G O, or G O P (*fig.* 2.) under which the leaft refrangible rays can come to the eye at O, after two reflections and two refractions, is 50° 57′, and the leaft angle H O P, under which the moft refrangible rays can come to the eye in this cafe, is 54° 7′. Whence all the colours of the exterior bow will be formed in the drops from G to H, which is the breadth of this bow, viz 3° 10′, whereas the breadth of the other, viz. E F, is but 1° 45′, and the diftance between the bows, viz. F G, is 8° 55′. And fuch would be the meafure of the bows, were the fun but a point; but fince his body fubtends an angle of half a degree, it is evident, by fo much each bow will be increafed, and their diftance diminifhed.

To apprehend rightly the different affections of this remarkable phænomenon, we muft attend to the following particulars: firft, that though each bow be occafioned by the refracted and reflected light of the fun falling on the drops of rain, yet neither of them is produced by any rays falling on any part of the drop indifferently, but by thofe only which fall on the furface of the drop B L Q G (*fig.* 1.) in or about the point N, as the ray A N; thofe which fall nearer to B, or further towards L, being unconcerned in this production.

Secondly, The internal bow is produced by two refractions, and one reflection. The firft reflection is of the incident rays extremely near A N, by which they proceed from N to one common point or focus at F, from whence they are reflected to G, and are there a fecond time refracted towards R, and produce the various colours of the faid bow.

Thirdly, There is a neceffity that feveral rays fhould be refracted together to the point F (*fig.* 3.) that being reflected together from thence to G, they may there go out parallel, and fo come in quantity fufficient to excite the fenfation of colours in a ftrong and lively manner. Now thofe rays, and thofe only, which are incident on the globule about the point N, can do this, as will appear from what follows; for,

Fourthly, The point F makes the arch Q F a maximum, or the diftance Q F from the axis of the drop S Q is greater than any other diftance from whence any other rays nearer to the axis, as S D, S E, or further from it, as S H, S I, are reflected; becaufe thofe which are nearer after the firft refraction tend to points in the axis produced more remote than that to which the ray S N tends; and, therefore, as their diftance from the axis increafes, fo, likewife, will the diftances of their points of reflexion Q P, Q O, till the ray becomes S N; after which, the rays more remote from the axis, as S H, S I, are refracted towards the points X Y, which are nearer and nearer to the axis: and this occafions the points of the reflection on the furtheft fide of the drop to decreafe again from F towards Q.

Fifthly, Hence it will neceffarily happen, that fome rays above and below the ray S N will fall upon the fame point, as O or P on the furtheft fide; and, for that reafon, they will be fo reflected from thence, as to go out of the drop by refraction parallel to each other. Thus, let S E below, and S H above the ray S N, be refracted both to one point O; from whence they will be reflected to M and L, and will there emerge parallel, it is true, but alone; being diverted of their intermediate rays S N, which, going to a different point F, will be reflected in a different direction to G, and emerge on one fide, and not between thofe rays, as when they were incident on the drop. All which is evident from the figure.

Sixthly, As this will be the cafe of all the rays which are not indefinitely near to S N, it is plain, that being deprived of the intermediate rays, their denfity will be fo far diminifhed, as to render them ineffectual for exciting the fenfation of colours; and they are therefore called inefficacious rays, in contradiftinction to thofe which enter the drop near S N, and which, having the fame point F of reflection, are not fcattered like the others, but emerge together at G, fo as to conftitute a beam G R of the fame denfity with the incident beam S N, and therefore capable of exhibiting a vivid appearance of colours, and for this reafon are called efficacious rays.

Phænomena of the Rainbow. The firft is, that each is variegated with all the prifmatick colours. This is a neceffary confequence of the different refrangibility of the rays refracted and reflected in drops of falling rain. Let A (*plate* LXXI. *fig.* 1.) be fuch a drop, S N a ray entering it at N, which is refracted to F, from whence refracted to G, where, as it emerges, it is refracted into all the feveral forts of rays of which it is compofed, viz. G R, the leaft refrangible or red making ray, G O the orange, G Y the yellow, G G the green, G B the blue, G I the indigo, and G V the violet, or moft refrangible ray.

The truth of this may be eafily proved by experiment, by fufpending a glafs globe filled with water in the funfhine, and viewing it in fuch a pofition, that the rays S N will fall upon it, and emerge to the eye at A, under the feveral angles from S F R to S F V; which may be eafily effected by letting the globe defcend from A to G, by a ftring going over a pulley.

Hence, the fecond phænomenon, viz. the circular form is accounted for, and, alfo, the third, which is the breadth of the bow; for that will be equal to the angle $ARG = RGV = 1° 45′$, where the ray as here emerges after one reflection. Thefe particulars are reprefented more completely in (*fig.* 2.) where B G D is the red circumference formed by the rotation of the ray A G, that can

can first come to the eye at A; and C g F is the violet arch formed by the least refrangible ray g A; after which the rays are all refracted below the eye. And thus, by the intermediate rays and colours, the whole interior bow is produced.

The fourth phænomenon is the appearance of two bows. This follows from hence, that after an efficacious ray of light S N, entering a drop of rain, has been twice reflected on the furthest side at F and H, it will emerge refracted into all its simple or constituent rays at G upon the upper side of the drop, so as to make with the incipent ray the angle G Y N, or S Y A, $=54°\ 10'$, if that ray be the violet sort, or most refrangible; but if it be of the red or least refrangible sort, then the said angle is but $50°\ 58' = S\,y\,A$.

Therefore, all those drops which are so situated around the eye, that their most refrangible rays shall fall upon it, must with those rays make an angle with the line A P passing through the eye parallel to the sun's rays, viz. the angle G A P, equal to the angle S Y A, or $GAP = 54°\ 10'$. These rays, therefore, will every where exhibit a violet colour in the arch P G L. For the same reason, those drops whose least refrangible rays fall upon the eye at A, make the angle $g\,AP = 50°\ 58'$; and so the ray A g, revolving about the axis A Q, will describe the circular arch M g K, which will exhibit the deepest red; and all the drops between G and g will paint the several other coloured peripheries, all which together will complete the exterior bow.

The fifth phænomenon is the greater breadth of the exterior bow. Thus, if from $54°\ 10'$ we subduct $50°\ 58'$, we shall have $3°\ 12' = G\,g =$ the width of the outer bow; which, therefore, is almost twice as wide as the interior bow.

The sixth phænomenon is the distance between the two bows, which is thus determined: from the angle which the least refrangible ray in the upper bow makes with the axis A P, viz. $50°\ 58'$, subtract the angle $42°\ 02'$ which the most refrangible rays make therewith in the lower bow, and the remainder $8°\ 56' = g$ A F is the arch of distance between the bows.

The seventh phænomenon is the inverse order of the colours in the two bows. This follows from the contrary parts of the drop on which the ray is incident, and from whence it emerges and is refracted. Thus, because the rays S N enter the upper part of the drop, and emerge from the lower, it is evident the rays refracted in this case (viz. in the interior bow) will have a situation quite the reverse of those which enter on the lower part of the drop, and are refracted from the upper, as in the exterior bow, whose colours are violet, indigo, blue, green, yellow, orange, and red; whilst those of the other are red, orange, yellow, green, blue, indigo, and violet; counting from the upper parts downwards in both.

The eighth phænomenon is the faintness of the exterior bow, in comparison of the interior one. This is the consequence of the rays being twice reflected within the drops which form the outer bow. They who make the experiment in a dark chamber, may wonder when they observe how large a part of the beam (that enters the globule at N) goes out at F, that there should be enough in the remaining part F G to exhibit the colours so strong and vivid in the first bow as they appear; but then, considering how much of this residual ray is refracted at G, it is rather a wonder how the very small part reflected to H, should there, when refracted, be in quantity sufficient to excite any distinct ideas of colours at all.

The ninth phænomenon is, that sometimes more than two bows appear; as in a very black cloud we have observed fourth, and a faint appearance of a fifth: but this happens rarely. Now, these spurious bows, as we call them, cannot be formed in the manner as the two principal bows are, that is, by a refraction after a 3d, 4th, 5th, &c. refraction; for the beam is by much too weak to exhibit colours by refraction, even after the 3d reflection only, much less would it a 4th or 5th. Besides, though after a 3d and 4th reflection of the rays they should be supposed capable of shewing their colours, yet the bows made thereby would not appear at the same time with the other two, nor in the same part of the heavens, but in the rain between us and the sun, and must be viewed by the spectator's face turned towards the sun, and not from it, as in the other case.

The tenth phænomenon is the appearance of the bows in that part of the heavens opposite to the sun. This necessarily happens from the incident and emergent ray being both on one side of the drop, for it is evident, that in order to see the colours, we must look to that part against which the sun shines.

The eleventh phænomenon is, that they never appear but when and where it rains. This is because rain affords a sufficient plenty of drops, or aqueous spherules, proper to reflect and refract the light fit for this purpose, which cannot be done without a requisite size, figure, and disposition of the particles, which the vapour of the cloud does not admit, and therefore clouds alone exhibit no such appearance.

The twelfth phænomenon is the dimension of the bows. This is determined easily, for continuing the axis A P to Q the centre of the bows, we have the semidiameter of each bow in the angle Q A g, or Q A G; the double of which gives the angles which the whole diameters of the bows subtend, and are therefore the measure of their magnitude.

The thirteenth phænomenon is, the altitude of the bow above the horizon, or surface of the earth. This is equal to the angle G A T, which may be taken by a quadrant, or it may be known for any time by having given the sun's altitude, which is equal to the angle T A Q; which therefore subducted from the constant angles Q A F, or Q A Y, will always leave the angle of the apparent height of the bow.

Lunar RAINBOW. The moon sometimes also exhibits the phænomenon of an iris, by the refraction of her rays in drops of rain in the night-time.

Aristotle says, he was the first that ever observed it, and adds, that it is never visible, but at the time of full moon. The lunar iris has all the colours of the solar, only fainter.

Marine RAINBOW, the sea-bow, is a phænomenon sometimes observed in a much agitated sea, when the wind, sweeping part of the tops of the waves, carries them aloft; so that the rays of the sun are refracted, &c. as in a common shower.

F. Bourzes, in Phil. Transf. observes, that there are scarce above two colours distinguishable, a dark yellow on the side next the sun, and a pale green on the opposite side. But there are sometimes 20 or 30 of them seen together. They appear at noon-day, and in a position opposite to that of the common bow, the concave side being turned upwards.

There is a kind of white colourless rainbow which Mentzelius and others saw at noon-day. M. Marriote, in his fourth Essai de Physique, says, they are formed in mists, as the others are in showers; having observed several of them both after sun-rising and in the night. The want of colours in these is owing to the exceeding tenuity of the vesicles of the vapour, which being only little watery pellicles bloated with air, the rays of light undergo but little refraction in passing out of air into them. Hence, the rays are reflected compounded, as they come.

Rohault mentions coloured rainbows on the glass formed in the morning dew.

RAISER, in building, a board set on edge under the foreside of a step, &c.

RAISING, in the menage, one of the three actions of a horse's legs; the other two being the stay and the tread.

RAISING *Pieces*, reason-pieces, in architecture, are pieces that lie under the beams, and over the posts or puncheons.

RAISINS, grapes prepared by suffering them to remain on the vine till they are perfectly ripe, and then drying them in the sun, or by the heat of an oven. The difference between raisins dried in the sun, and those dried in ovens, is very obvious; the former are sweet and pleasant, but the latter have a latent acidity with the sweetness that renders them much less agreeable.

The common way of drying grapes for raisins, is to tie two or three bunches of them together while yet on the vine, and dip them into a hot lixivium of vine-ashes, with a little of the oil of olives in it. This disposes them to shrink and wrinkle, and after this they are left on the vine three or four days separated on sticks in an horizontal situation, and then dried in the sun at leisure, after being cut from the tree. The finest and best

raisins

raiſins are thoſe called in ſome places Damaſcus and Jube raiſins; which are diſtinguiſhed from the others by their ſize and figures: theſe are flat and wrinkled on the ſurface, ſoft and juicy within, and near an inch long, and when freſh and growing on the bunch, are of the ſize and ſhape of a large olive.

The raiſins of the ſun, and jar-raiſins, are all dried by the heat of the ſun, and theſe are the ſorts uſed in medicine. However, all the kinds have much the ſame virtues; they are all nutritive and balſamick: they are allowed to be attenuant, are ſaid to be good in nephritick complaints, and are an ingredient in pectoral decoctions, in which caſes, as alſo in all others where aſtringency is not required of them, they ſhould have the ſtones carefully taken out.

RAITING, or Rating, the laying of flax, hemp, timber, &c. when green, in a pond or running water, to ſeaſon and prepare it for future uſes.

RAKE *of a Ship*, is all that part of her hull which hangs over both ends of her keel. That which is before, is called the fore-rake, or rake-forward; and that part which is at the ſetting on of the ſtern-poſt, is called the rake-aft, or afterward.

Rake *of the Rudder*, is the hindermoſt part of it.

RAKING-TABLE, or Raked-Table, among architects, is a member hollowed in the ſquare of a pedeſtal, &c.

RALLYING, in war, re-aſſembling or calling together troops broken and put to flight.

RAM, in zoology, the male of the ſheep kind. See Sheep.

Ram, in aſtronomy, the ſame with Aries. See Aries.

Battering Ram, in antiquity, a military engine uſed to batter and beat down the walls of places beſieged.

The battering ram was of two ſorts, the one rude and plain, the other compound. The former ſeems to have been no more than a great beam which the ſoldiers bore on their arms and ſhoulders, and with one end of it by main force aſſailed the wall. The compound ram is thus deſcribed by Joſephus: it is a vaſt beam, like the maſt of a ſhip, ſtrengthened at one end with a head of iron, ſomething reſembling that of a ram, whence it took its name. (See *plate* LXIX. *fig.* 8.) This was hung by the middle with ropes to another beam, which lay acroſs two poſts; and hanging thus equally ballanced, it was by a great number of men drawn backwards and puſhed forwards, ſtriking the wall with its iron head.

Plutarch informs us, that Mark Anthony, in the Parthian war, made uſe of a ram 80 feet long: and Vitruvius tells us, that they were ſometimes 106, and ſometimes 120 feet in length; and to this perhaps, the force and ſtrength of the engine was in a great meaſure owing. The ram was managed at one time by a whole century of ſoldiers, and they being ſpent, were ſeconded by another century, ſo that it played continually without any intermiſſion.

In order to calculate the force of the battering-ram, R, (*plate* LXIX. *fig.* 8.) ſuppoſe it to be 28 inches in diameter, and 180 feet long; and conſequently its ſolid content 750 cubick feet; which, allowing 50 pounds for each foot, will weigh 37,500 pounds: and ſuppoſe its head of caſt-iron, together with three iron hoops, &c. to be 3612 pounds. Now all theſe weights, added together, make 41,112 pounds, equal to the weight of the whole ram; which will require 1000 men to move it, ſo as to cauſe it to ſtrike againſt the point L of the wall AHIGE, each man moving a weight of 41 pounds. The quantity of motion produced by this action, when the ram moves one foot in a ſecond, may be expreſſed by the number 41,112; which motion or force, compared with the quantity of motion in the iron-ball B, ſhot out of the cannon C, will be found equal to it: for a cannon-ball is known to move as faſt as found for about the ſpace of a mile; and if you multiply 36 pounds, the weight of the ball, by 1142, the number of feet which found moves in one ſecond, you will have the number 41,112 for the quantity of motion or force in the ball B ſtriking at L. And if, after a few ſtrokes given by the battering-ram, the mortar or cement is ſo looſened, that the piece of the wall ADDFE is at laſt by a ſtroke of the ram carried forward from F to K, and ſo beaten down; the ſame thing will be performed by a cannon-ball, after an equal number of ſtrokes.

This ſhews how advantageous the invention of gun-powder is; ſince we are thereby enabled to give ſuch a prodigious velocity to a ſmall body, that it ſhall have as great a quantity of motion as a body immenſely greater, and requiring vaſtly more hands to work it: for three men will manage a cannon, which ſhall do as much execution as the above battering-ram wrought by 1000. The ram, whoſe force is here calculated, is taken at a mean; being bigger than ſome, and leſs than others, of thoſe uſed by the ancients.

Ram's Head, in a ſhip, is a great block belonging to the fore and main-halliards. It has three ſhivers in it, into which the halliards are put, and in a hole at the end of it are reeved the ties.

RAMADAN, a ſolemn ſeaſon of faſting among the Mahometans, kept in the ninth month of the Arabick year.

RAMIFICATION, the production of boughs or branches, or of figures reſembling branches.

RAMMER, an inſtrument uſed for driving down ſtones or piles into the ground; or for beating the earth, in order to render it more ſolid for a foundation.

Rammer *of a Gun*, the gun-ſtick; a rod uſed in charging of a gun, to drive home the powder, as alſo the ſhot and the wad, which keeps the ſhot from rolling out. The rammer of a great gun is uſed for the ſame purpoſe. It has a round piece of wood at one end, and the other is uſually rolled in a piece of ſheep-ſkin, fitted to the bore of the piece, and is uſed to clear her after ſhe has been diſcharged, which is called ſponging the piece.

RAMPANT, in heraldry, a term applied to a lion, leopard, or other beaſt that ſtands on his hind legs, and rears up his fore feet in the poſture of climbing, ſhewing only half his face, as one eye, &c. It is different from ſaliant, in which the beaſt ſeems ſpringing forward, as if making a ſally.

RAMPART, in fortification, is an elevation of earth round a place, capable of reſiſting the cannon of an enemy; and formed into baſtions, curtins, &c.

A rampart ought to be ſloped on both ſides, and to be broad enough to allow room for the marching of waggons and cannon, beſide that allowed for the parapet, which is raiſed on it: its thickneſs is generally about 10 or 12 fathoms, and its height not above three, which is ſufficient to cover the houſes from the battery of the cannon. The rampart is encompaſſed with a ditch, and is ſometimes lined or fortified on the inſide, otherwiſe it has a berme. See Berme. Upon the rampart ſoldiers continually keep guard, and pieces of artillery are planted there for the defence of the place.

Rampart, in civil architecture, is uſed for the ſpace left between the wall of a city, and the next houſes.

RANCID, denotes a fatty ſubſtance that is become rank or muſty; or has contracted an ill ſmell by being kept cloſe.

RANDOM Shot, in gunnery, is a ſhot made when the muzzle of a gun is raiſed above the horizontal line, and is not deſigned to ſhoot directly, or point-blank.

The utmoſt random of any piece is about 10 times as far as the bullet will go point-blank. The bullet will go furtheſt when the piece is mounted to about 45° above the level range. See Gunnery.

RANGE, in gunnery, the path of a bullet, or the line it deſcribes from the mouth of the piece to the point where it lodges.

RANGER, a ſworn officer of a foreſt, appointed by the king's letters patent, whoſe buſineſs is to walk through his charge, to drive back the deer out of the purlieus, &c. and to preſent all treſpaſſes within his juriſdiction at the next foreſt-court.

RANGES, in a ſhip, two pieces of timber that go acroſs from ſide to ſide; the one on the forecaſtle, a little abaft the foremaſt, and the other in the beak-head, before the wouldings of the bowſprit.

RANGING, in war, diſpoſing the troops in the order proper for an engagement, or for marching.

Ranging, in building, ſignifies running ſtrait, when the ſides of a work do not break into angles.

RANK, the order or place allotted a perſon, ſuitable to his quality or merit.

Rank, in war, is a row of ſoldiers, placed ſide by ſide.

RANSOM, a ſum of money paid for the redemption of a ſlave, or for the liberty of a priſoner of war. In

our

our law-books, ranfom is alfo ufed for a fum paid for the pardon of fome great offence, and to obtain the offender's liberty.

RANT, in the drama, an extravagant, unnatural, and improbable flight of paffion.

RANULA, or RANA, in medicine, a tumour under the tongue, which, like a ligature, hinders a child from fpeaking or fucking. The matter contained in thefe tumours is various, it being fometimes a tenacious and mucous lymph, fometimes a thick and purulent matter, and fometimes of a hard and ftony confiftence.

The fafeft method of cure, according to Heifter, is to turn the tongue upwards, and to make a tranfverfe incifion through the tumour, in order to difcharge the included matter; after which you may deterge or deftroy the remaining tunick with honey of rofes fharpened with fpirits of vitriol, and then the cure may be eafily completed with a mixture of oil and fugar. Sometimes the tubercle breaks of itfelf, and then you muft deterge and heal the ulcer as before.

RANUNCULUS, crowfoot, in botany, a genus of plants, whofe flower confifts of five obtufe petals with fmall ungues, each having an open nectarium above the claws; the filaments are numerous, about half the length of the petals, and terminated by erect, oblong, obtufe, twin antheræ: there is no pericarpium; but the feeds, which are irregular and numerous, are connected to the receptacle by very fhort peduncles.

Botanifts enumerate divers fpecies belonging to this genus, but the oriental forts are moft admired and cultivated in our gardens, as few flowers equal them, either in richnefs of colour, or for the variety and beautiful mixture of their tints. They are natives of Turkey, Arabia and Perfia, from whence they have been imported into Europe.

RAPE, a fpecies of braffica, or cabbage, defcribed by authors under the name of the napus fylveftris and bunius fylveftris. This plant is much cultivated for feeding cattle in feveral counties of England. The feafon for fowing is about the middle of June, and the plants afterwards fhould be hoed out as practifed with turneps, with the difference only of leaving them much nearer together.

As this plant is fo hardy as not to be deftroyed by froft, it is of great fervice in hard winters for feeding fheep; for when the ground is fo hard frozen as that the turneps cannot be taken up, thefe plants may be cut off for a fupply: they will alfo afford late food, after the turneps are run to feed; and if it is afterwards permitted to ftand for feed, it will pay extremely well, for from the feed is drawn an oil, called rape-oil, which is ufed in the woollen manufactures, and, in the materia medica, is efteemed attenuant, cordial, and fudorifick.

RAPE, in law, the having carnal knowledge of a woman by force and againft her will.

RAPE *of the Foreft*, a trefpafs committed in a foreft by violence.

RAPE, is alfo a name given to the divifion of a county, and fometimes means the fame as a hundred, and at other times fignifies a divifion, confifting of feveral hundreds; thus Suffex is divided into fix rapes, every one of which, befides its hundreds, has a caftle, a river, and a foreft, belonging to it. The like parts in other counties are called tithings, lathes, or wapentakes.

RAPE, alfo fignifies the ftalks of the clufters of grapes, when dried and freed from the fruit. This is ufed in making vinegar.

RAPHANUS, the radifh, in botany. See RADISH.

RAPIER, formerly fignified a long, old-fafhioned broad fword, fuch are thofe worn by the common foldiers; but it now denotes a fmall fword, as contradiftinguifhed from a back fword.

RAPINE, in law, taking away another's goods, &c. openly ar[illegible] by violence.

RAPTURE, an ecftafy or tranfport of mind.

RARE, in phyficks, denotes a body that is very porous, the parts of which are at a great diftance from one another, and containing but little matter under a great deal of bulk. And thus it ftands oppofed to denfe. The corpufcular philofophers, as the Epicureans, Gaffendifts, Newtonians, &c. affert that fome bodies are rarer than others, by virtue of a great quantity of vacuity included between their pores. The Cartefians hold that it only confifts in a greater quantity of materia fubtilis included in its pores; and, laftly, the Peripateticks contend, that rarity is a new quality fuperinduced upon a body, without any dependance either on vacuity or fubtile matter.

RAREFACTION, *Rarefactio*, in phyficks, the act whereby a body is rendered rare. It is oppofed to condenfation. The degree to which the air is rarifiable exceeds all imagination. See AIR.

RASANT, or RAZANT, in fortification: rafant-flank, or line, is that part of the curtin or flank whence the fhot exploded rafe, or glance, along the furface of the oppofite baftion.

RASH, in medicine, an eruption upon the fkin, thrown out in fevers or furfeits.

RASP, a rough or rank fort of file.

RASPBERRY-BUSH, in botany, a fpecies of rubus, the root is perennial, and divided into feveral branches, from which arife feveral annual ftalks, about fix feet high, armed with thorns: the leaves are like thofe of the bramble, but more tender and foft; of a brownifh green above, but whitifh underneath: the flowers are white, and confift of five petals, difpofed in the form of a rofe; and the cup is divided into five parts, from the centre of which the piftil arifes, furrounded with many ftamina, which is afterwards fucceeded by a well known fruit, of a white or red colour. The rafpberry is commonly propagated by fuckers, which fhould be planted about two feet afunder in the rows, and five feet row from row; they like a good ftrong frefh foil. In autumn, thofe fhoots which produced the fruit will decay, when they fhould be taken off, and a few of the ftrongeft young fhoots preferved, for bearing the fucceeding year; cutting out all thofe that are weak, and digging between the rows in winter, which is all the management they require.

RAT, in zoology, the Englifh name of feveral fpecies of the mus kind; as the common-rat, the ground-rat, and the water-rat.

RAT-TAILS, or *Arrefts*, in the menage, fignify hard callous fwellings upon the hinder legs, under the hough, running along the finew. A horfe is called rat-tail, when he has no hair upon his tail.

RATAFIA, a fine fpirituous liquor, prepared from the kernels, &c. of feveral kinds of fruit, particularly of cherries and apricots.

RATCH, or RASH, in clock-work, a fort of wheel having 12 fangs, which ferve to lift up the detents every hour, and make the clock ftrike. See CLOCK.

RATCHATS, in a watch, are the fmall teeth at the bottom of the fufee, or barrel, which ftops it in winding up.

RATE, a ftandard or proportion, by which either the quantity or value of a thing is adjufted.

RATE *of a Ship of War*, is its order, degree, or diftinction, as to magnitude, burden, &c. The rate is ufually accounted by the length and breadth of the gun-deck, the number of tons, and the number of men and guns the veffel carries. Of thefe there are fix rates. A firft rate man of war has its gun-deck from 159 to 174 feet in length, and from 44 to 50 feet broad; it contains from 1313 to 1882 tons, has from 706 to 800 men, and carries from 96 to 100 guns. Second rate fhips have their gun-decks from 153 to 165 feet long, and from 41 to 46 broad; they contain from 1086 to 1482 tons, and carry from 524 to 640 men, and from 84 to 90 guns. Third rates have their gun-decks from 140 to 158 feet in length, from 37 to 42 feet broad; they contain from 871 to 1262 tons; carry from 389 to 476 men, and from 64 to 80 guns. Fourth rates are in length on their gun-decks from 118 to 146 feet, and from 29 to 38 broad, they contain from 448 to 915 tons; carry from 226 to 346 men, and from 48 to 60 guns. Fifth rates have their gun-decks from 100 to 120 feet long, and from 24 to 31 broad, they contain from 259 to 542 tons, and carry from 145 to 190 men, and from [illegible]6 to 44 guns. Sixth rates have their gun-decks from 87 to 95 feet long, and from 22 to 25 broad; they contain from 152 to 256 tons, carry from 50 to 110 men, and from 16 to 24 guns.

It is to be obferved, that the new built fhips are much larger, as well as better than the old ones of the fame rate; whence the double numbers all along: the larger of which exprefs the proportions of the new built fhips, as the lefs thofe of the old ones.

RATTEEN, or RATTEN, in commerce, a thick woollen

woollen ſtuff, quilled, woven on a loom with four treddles, like ſerges and other ſtuffs that have the whale or quilling.

RATIFICATION, *Ratificatio*, an act approving of, and confirming ſomething done by another in our name.

RATIO, in arithmetick and geometry, is that relation of homogeneous things which determines the quantity of one from the quantity of another, without the intervention of a third.

Two numbers, lines, or quantities, A and B, being propoſed, their relation one to another may be conſidered under one of theſe two heads: 1. How much A exceeds B, or B exceeds A; and this is found by taking A from B, or B from A, and is called arithmetick reaſon or ratio. 2. Or how many times, and parts of a time, A contains B, or B contains A; and this is called geometrick reaſon or ratio; (or, as Euclid defines it, it is the mutual habitude, or reſpect, of two magnitudes of the ſame kind, according to quantity; that is, as to how often the one contains, or is contained in the other) and is found by dividing A by B, or B by A; and here note, that that quantity which is referred to another quantity, is called the antecedent of the ratio; and that to which the other is referred, is called the conſequent of the ratio; as, in the ratio of A to B, A is the antecedent, and B the conſequent. Therefore any quantity, as antecedent, divided by any quantity as a conſequent, gives the ratio of that antecedent to the conſequent.

Thus the ratio of A to B is $\frac{A}{B}$ but the ratio of B to A is $\frac{B}{A}$; and, in numbers, the ratio of 12 to 4 is $\frac{12}{4}=3$, or triple; but the ratio of 4 to 12 is $\frac{4}{12}=\frac{1}{3}$, or ſubtriple.

And here note, that the quantities thus compared, muſt be of the ſame kind; that is ſuch, which, by multiplication, may be made to exceed one the other, or as theſe quantities are ſaid to have a ratio between them, which, being multiplied, may be made to exceed one another. Thus a line, how ſhort ſoever, may be multiplied, that is produced ſo long as to exceed in length any given right line, and conſequently theſe may be compared together, and the ratio expreſſed: but as a line can never, by any multiplication whatever, be made to have breadth, that is, to be made equal to a ſuperficies, how ſmall ſoever; theſe can therefore never be compared together, and conſequently have no ratio or reſpect one to another, according to quantity; that is, as to how often the one contains, or is contained in another.

RATIOCINATION, *Ratiocinatio*, the act of reaſoning.

RATION, or Ratian, in the army, a portion of ammunition, bread, drink, and forage, diſtributed to each ſoldier in the army, for his daily ſubſiſtence, &c. The horſe have rations of hay and oats when they cannot go out to forage. The ſhips crew have alſo their rations or allowances of biſcuit, pulſe, and water, proportioned according to their ſtock.

RATIONAL, reaſonable.

Rational is alſo applied to integral, fractional, and mixed numbers: thus we ſay, rational fractions, rational integer, and rational mixt number; that is, ſuch fractions, integers, &c. as are parts of unity.

Rational *Horizon*, that whoſe plane is conceived to paſs through the centre of the earth.

RATIONALE, a ſolution or account of the principles of ſome opinion, action, hypotheſis, phænomenon, or the like.

RATLINES, or, as the ſeamen call them, Ratlins, thoſe lines which make the ladder ſteps to get up the ſhrouds and puttocks, hence called the ratlings of the ſhrouds.

RATTLE-SNAKE, *Crotalaphorus*, in zoology, a genus of ſerpents, having ſcuta that cover the whole under-ſurface of the body and tail, and having the extremity of the body terminated by a kind of rattle, formed of a ſeries of urceolated articulations, which are moveable, and make a noiſe. Of this ſerpent there are two ſpecies, the greater one with the ſcuta of the abdomen 172, of the tail 21; and the leſs rattle-ſnake, having the ſcuta of the abdomen 165, of the tail 28.

Rattle-Snake-*Root*, the ſame with the ſenega, a ſpecies of the polygala. See Polygala.

RAUCEDO, hoarſeneſs, in medicine. See the article Hoarseness.

RAVELIN, in fortification, was anciently a flat baſtion, placed in the middle of a curtin; but now a detached work, compoſed only of two faces, which make a ſaliant angle, without any flanks, and raiſed before the curtin on the counterſcarp of the place. A ravelin is a triangular work, reſembling the point of a baſtion, with the flanks cut off.

RAVEN, in ornithology, a ſpecies of the corvus, of the bigneſs of a common hen, of a black colour, with a blue back: the head is ſmall, depreſſed on the crown, and flatted on both ſides: the eyes are large, bright and piercing; the beak is conſiderably long, and ſomewhat ridged on the back, and ſharp at the point.

RAVISHMENT, in law, denotes an unlawful ſeducing either of a woman, or an heir that is in ward: ſometimes it is alſo uſed in the ſame ſenſe as a rape.

RAY, in opticks, a beam of light, emitted from a radiant, or luminous body. See Light.

RAYONANT, or *Croſs* Rayonant, in heraldry, one which has rays of glory behind it, darting out from the centre to all the quarters of the eſcutcheon.

RE, in grammar, an inſeparable particle added to the beginning of words, to double, or otherwiſe modify their meaning; as in re-action, remove, re-export, &c.

REACH, in the ſea-language, ſignifies the diſtance between any two points of land, lying nearly in a right line.

RE-ACTION, in phyſiology, the reſiſtance made by all bodies to the action or impulſe of others, that endeavour to change its ſtate, whether of motion or reſt. See Action and Motion.

REALISTS, *Realiſtæ*, a ſect of ſchool philoſophers, formed in oppoſition to the Nominaliſts. See the article Nominalists.

Under the realiſts are included the Scotiſts, Thomiſts, and all excepting the followers of Ocham. Their diſtinguiſhing tenet is, that univerſals are realities, and have an actual exiſtence out of an idea, or imagination; or, as they expreſs it in the ſchools, a parte rei; whereas the Nominaliſts contend that they only exiſt in the mind, and are only ideas, or manners of conceiving things.

REAR, a term frequently uſed in compoſition to denote ſomething behind, or backwards, in reſpect of another, in oppoſition to van: thus, in a military ſenſe, it is uſed for the hinder part of an army, in oppoſition to the front. For the rear-guard, rear-half-files, rear-line, rear-rank, and rear-admiral, ſee Guard, File, Line, Rank, and Admiral.

REASON, *Ratio*, a faculty or power of the mind, whereby it diſtinguiſhes good from evil, truth from falſhood; whereby man is diſtinguiſhed from beaſts, and wherein it is evident he greatly ſurpaſſes them: or, reaſon is that principle, whereby, comparing ſeveral ideas together, we draw conſequences from the relations they are found to have.

Reaſon, in the Engliſh language, has different ſignifications: ſometimes it is taken for true and clear principles; ſometimes for clear and fair deductions from thoſe principles; and ſometimes for the cauſe, and particularly the final cauſe.

If general knowledge conſiſts in a perception of the agreement or diſagreement of our own ideas, and the knowledge of the exiſtence of all things without us (except only of God, whoſe exiſtence every man may certainly know and demonſtrate to himſelf from his own exiſtence) we had only by our ſenſes: what room then is there for the exerciſe of any other faculty, but outward ſenſe and inward perception? What need is there of reaſon? Very much, both for the enlargement of our knowledge, and regulating our aſſent: for it hath to do both in knowledge and opinion, and is neceſſary and aſſiſting to all our other intellectual faculties, and indeed contains two of them, viz. ſagacity and illation. By the one it finds out, and by the other it ſo orders the intermediate ideas, as to diſcover what connection there is in each link of the chain, whereby the extremes are held together; and thereby, as it were, to draw into view the truth ſought for, which is that we call illation or inference, and conſiſts in nothing but the perception of the connection that is between the ideas of each ſtep of the deduction; whereby the mind comes to ſee either

the certain agreement or disagreement of any two ideas, as in demonstration, in which it arrives at knowledge; or their probable connection, on which it gives or withholds its assent, as in opinion. Sense and intuition reach but a very little way. The greatest part of our knowledge depends upon deductions and intermediate ideas: and in those cases where we are fain to substitute assent instead of knowledge, and take propositions for true without being certain they are so, we have need to find out, examine, and compare the grounds of their probability. In both these cases the faculty which finds out the means, and rightly applies them to discover certainty in the one, and probability in the other, is that which we call reason. For as reason perceives the necessary and indubitable connection of all the ideas or proofs one to another, in every step of discourse in which it will think assent due; this is the lowest degree of that which can be truly called reason. For where the mind does not perceive this probable connection, where it does not discern whether there be any such connection or no, the man's opinions are not the product of judgment, or the consequence of reason, but the effects of chance and hazard of a mind floating at all adventures without choice, and without direction.

So that we may in reason consider these four degrees: the first and highest is the discovering and finding out of proofs; the second, the regular and methodical disposition of them, and laying them in a clear and fit order, to make their connection and force be plainly and easily perceived; the third is the perceiving their connection; and the fourth making a right conclusion. These several degrees may be observed in any mathematical demonstration: it being one thing to perceive the connection of each part, as the demonstration is made by another; another to perceive the demonstration of the conclusion on all the parts; and the third to make out a demonstration clearly and neatly one's self; and something different from all these, to have first found out those intermediate ideas or proofs by which it is made. *Locke on Human Understanding.*

REASONING, ratiocination, the exercise of that faculty of the mind called reason; or it is an act or operation of the mind, deducing some unknown proposition from other previous ones that are evident and known.

It often happens in the comparing ideas together, that their agreement or disagreement cannot be discerned at first view, especially if they are of such a nature as not to admit of any exact application to one another: here then, as has already been observed under the article REASON, it becomes necessary to look out some third idea that will admit of such an application as the present case requires. Hence it appears that every act of reasoning necessarily includes three distinct judgments, two wherein the ideas whose relation we want to discover, are severally compared with the middle idea, and a third wherein they are themselves connected, or disjoined according to the result of that comparison. Now as our judgments when put into words are called propositions, so the expressions of our reasonings are termed syllogisms. And hence it follows, that as every act of reasoning implies three several judgments, so every syllogism must include three distinct propositions. See the article SYLLOGISM.

In order therefore to infer a conclusion by a single act of reasoning, the premises must be intuitive propositions, where they are not, previous syllogisms are required, in which case reasoning becomes a complicated act taken in a variety of successive steps. This frequently happens in tracing the more remote relations of our ideas, where many middle terms being called in, the conclusion cannot be made out, but in consequence of a series of syllogisms following one another in train. Hence we may clearly perceive that reasoning, in the highest exercise of that faculty, is no more than an orderly combination of simple acts of reasoning. See DEMONSTRATION.

Thus we see that reasoning, beginning with first principles, rises gradually from one judgment to another, and connects them in such a manner that every stage of the progression brings intuitive certainty along with it.

REAUMURIA, in botany, a genus of plants, whose corolla consists of five oblong equal petals, which are recurved at their tops; the filaments are numerous and topped with roundish antheræ; the fruit is an ovate capsule, having five valves, and five cells containing a great many oblong seeds.

REBATE, or REBATEMENT, in commerce, a term much used at Amsterdam, for an abatement in the price of several commodities, when the buyer, instead of taking time, advances ready money.

REBATEMENT, in heraldry, a diminution or abatement of the bearings, in a coat of arms. See ABATEMENT.

REBELLION, a traiterous taking up of arms against the king by his own natural subjects, or those formerly subdued.

REBELLIOUS ASSEMBLY, in law, an assembling together of 12 or more persons, with an intent of unlawfully making use of their own authority, to change or alter any laws of this kingdom, or to destroy the inclosures of any ground, or the banks of any fish-pond, pool, or conduit, to the intent that it may lie waste and void; or to destroy the deer in any park, fish in fish-ponds, coneys in any warren; or any house, barn, mills, or bays; or to burn sacks of corn, abate rents, or prices of victuals, &c. See RIOT.

REBUS, an ænigmatical representation of some name, &c. by using figures or pictures instead of words, or parts of words.

REBUTTER, in law, the defendant's answer to the plaintiff's surrejoinder, in a cause depending in the court of chancery, &c.

RECAPITULATION, in oratory, &c. a part of the peroration. Recapitulation is a summary, or a concise and transient enumeration of the principal things insisted on in the preceding discourse, whereby the force of the whole is collected into one view.

RECEIPT, or RECEIT, in commerce, an acquittance or discharge, in writing, intimating that the party has received a certain sum of money, either in full for the whole debt, or in part, or on account.

RECEIPT, in book-keeping, is an account of all the money and goods received. See BOOK.

RECEIVER, in chymistry, a vessel of earth, glass, &c. for receiving any distilled liquor.

RECEIVER, in pneumaticks, a glass vessel for containing the thing on which an experiment in the air-pump is to be made.

RECEPTACLE, among botanists, is the base which supports either the flower, fruit, or seeds; in respect to its form it is either flat, concave, convex, globular, conick, or pyramidal; and with regard to its surface, it is either naked, punctated, villose, bristly or paleaceous.

RECEPTACULUM CHYLI, or PECQUET's RESERVATORY, the reservoir or receptacle for the chyle, situated in the left side of the upper vertebra of the loins, under the aorta, and the vessels of the left kidney.

RECHABITES, a kind of religious order among the ancient Jews, instituted by Jonadab, the son of Rechab, comprehending only his own family and posterity.

Their founder prescribed them three things: first, not to drink any wine; secondly, not to build any houses, but to dwell in tents; and thirdly, not to sow any corn, or plant vines. These rules the Rechabites observed with great strictness.

RECHEAT, in hunting, a lesson which the huntsmen play on the horn, when the hounds have lost their game, to call them back from pursuing a counterscent.

RECIPE, in medicine, a prescription or remedy, to be taken by a patient; so called, because always beginning with the word recipe, i. e. take; which is generally denoted by the abbreviature ℞. For the rules proper to be observed in forming recipes, see PRESCRIPTION.

RECIPIANGLE, or RECIPIENT-*Angle*, a mathematical instrument, serving to measure re-entering and saliant angles, especially in fortification.

RECIPIENT, the same with receiver; which see.

RECIPROCAL, in general, something that is mutual, or which is returned equally on both sides, or that affects both parties alike.

RECIPROCAL *Terms*, among logicians, are those which have the same signification, and consequently are convertible, or may be used for each other.

RECIPROCAL *Figures*, in geometry, those which have the antecedents and consequents of the same ratio, in both figures.

RECIPROCAL *Proportion*, in arithmetick, is when in four

four numbers, the fourth is less than the second, by so much as the third is greater than the first; and vice versa. See PROPORTION.

RECITATIVO, or RECITATIVE, in musick, a kind of singing, that differs but little from ordinary pronunciation, such as that in which the several parts of the liturgy are rehearsed in cathedrals; or that wherein the actors commonly deliver themselves on the theatre at the opera, when they are to express some action or passion, to relate some event, or reveal some design.

RECKONING, or, *a Ship's* RECKONING, in navigation, is that account whereby at any time it may be known where the ship is, and on what course or courses she is to steer, in order to gain her port; and that account taken from the log-board is called the dead-reckoning. See LOG-BOARD, JOURNAL, &c.

RECLINATION *of a Plane*, in dialling, is the number of degrees any dial-plane deviates from a vertical position. The reclination of a plane is easily found; for having drawn a horizontal line on the plane, by a level or quadrant, and another line at right-angles to it; apply a ruler, so that one end of it may reach beyond the plane: this being done, a quadrant applied to the edge of the ruler will shew the degrees and minutes of the plane's reclination; accounting from that side of the quadrant which touches the edge of the ruler.

RECLUSE, among the papists, a person shut up in a small cell of an hermitage or monastery, and cut off, not only from all conversation with the world, but even with the house. This is a kind of voluntary imprisonment, from a motive either of devotion or penance.

The word is also applied to incontinent wives, whom their husbands procure to be thus kept in perpetual imprisonment in some religious house. Recluses were anciently very numerous; they took an oath, never to stir out of their retreat; and, having entered it, the bishop set his seal upon the door; and the recluse was to have every thing necessary for the support of life, conveyed to him through a window.

RECOGNIZANCE, in law, a bond, or obligation of record, acknowledged to the king; testifying the recognizor to owe to the recognizee a certain sum of money. It is thus called, because recognized, or acknowledged in some court of record, or before some judge, master in chancery, or justice of the peace. There are also recognizances for bail, others for appearing at the sessions, to prosecute a felon, others for good behaviour.

RECOGNIZEE, is he to whom the person is bound in a recognizance.

RECOGNIZOR, the person bound to another in a recognizance.

RECOLLECTION, a mode of thinking, whereby those ideas sought after by the mind are brought again to view.

RECONNOITRE, in military affairs, implies to view and examine the state of things, in order to make a report thereof.

RECORD, *Recordium*, in law, an authentick testimony of any thing in writing, contained in rolls of parchment, and preserved in a court of record.

RECORDARE FACIAS, a writ directed to the sheriff to remove a cause depending in an inferior court, to the King's-bench or Common-pleas.

RECORDER, a person whom the mayor, or other chief magistrate of any city or town corporate, having jurisdiction and a court of record within their precincts, associates with him, for his better direction in matters of justice, and proceedings according to law. In some towns where they have their particular assizes within themselves, and no mayor, the recorder is the judge.

RECORDO & *Processo mittendis*, a writ to call a record, together with the whole proceedings in the cause, out of an inferior court, into the king's court.

RECOVERY, in law, an obtaining any thing by judgment or trial at law.

True RECOVERY, is an actual or real recovery of any thing, or the value thereof, by judgment.

Feigned or common RECOVERY, is a kind of fictio juris, being a certain form or course prescribed by law to be observed for the better assuring of lands and tenements to us; the end and effect whereof is to discontinue and destroy estates tail, remainders, and reversions, and to bar the intails thereof.

RECREMENT, in medicine, some superfluous matter, mixed with others that are useful. See the article EXCREMENT.

RECREMENT is also used by some authors to imply such secreted juices in the body, as are afterwards of use to the œconomy; as the lymph, gall, &c.

RECRIMINATION, a posterior accusation brought by the accused against the accuser, upon the same fact.

RECRUDESCENCE, a term used by some medical authors to imply a relapse.

RECTANGLE, in arithmetick and algebra, the same with product or factum.

RECTANGLED, RECTANGULAR, or RIGHT-ANGLED, appellations given to figures and solids which have one or more right angles: thus a triangle with one right angle, is termed a rectangled triangle, also parellelograms with right-angles, squares, cubes, &c. are rectangular. Solids, as cones, cylinders, &c. are also said to be rectangular, with respect to their situation, when their axes are perpendicular to the plane of the horizon. The ancient geometricians always called the parabola the rectangular section of a cone.

RECTIFICATION, the art of setting any thing to rights: and hence, to rectify the globes, is to fit them for performing any problem.

RECTIFICATION, in geometry, is the finding a right line, equal in length to a curve.

RECTIFIER, in navigation, an instrument consisting of two parts, which are two circles either laid one upon, or let into the other, and so fastened together in their centres, that they represent two compasses, one fixed, the other moveable; each of them divided into the 32 points of the compass, and 360°, and numbered both ways, from the north and the south, ending at the east and west, in 90°. The fixed compass represents the horizon, in which the north and all the other points of the compass are fixed and immoveable. The moveable compass represents the mariners compass, in which the north and all other points are liable to variation. In the centre of the moveable compass is fastened a silk thread, long enough to reach the outside of the fixed compass. But, if the instrument be made of wood, there is an index instead of the thread. Its use is to find the variation of the compass, to rectify the course at sea, having the amplitude or azimuth given.

RECTILINEAR, in geometry, right-lined; thus figures whose perimeter consists of right-lines, are said to be rectilinear.

RECTOR, a term applied to several persons whose offices are very different: as, 1. The rector of a parish is a clergyman that has the charge and cure of a parish, and possesses all the tythes, &c. 2. The same name is also given to the chief elective officer in several foreign universities, particularly in that of Paris. 3. Rector is also used in several convents for the superior officer who governs the house; and the Jesuits give this name to the superiors of such of their houses as are either seminaries or colleges.

RECTORY, a parish-church, parsonage, or spiritual living, with all its rights, tythes and glebes. It is also used for the rector's mansion or parsonage-house.

RECTUM, in anatomy, the third and last of the great intestines. It is so called from its passing straight from the os sacrum to the anus, without making any turns or circumvolutions, as all the other intestines do.

RECTUS, in anatomy, a name common to several muscles, on account of the straightness of the course of their fibres, from their origin to their insertion.

RECURRENT NERVE, in anatomy, a branch of the par vagum, bestowed upon the organs of speech, whence it is also called vocal nerve.

RECUSANTS, persons who refuse to acknowledge the king's supremacy. Such are the Roman catholicks, who hold the pope to be over him; thence called popish recusants.

RED, in philosophy, one of the primary colours of light. See COLOURS. The red rays are of all the others the least refrangible. Hence, as Sir Isaac Newton supposes the different degrees of refrangibility to arise from the different magnitudes of the luminous particles, of which the rays consist; the red rays, or red light, is concluded to be that which consist of the larger particles.

Red is distinguished into three kinds; one bordering on the blue, as columbine or dove-colour, purple or crimson;

crimfon; another bordering on yellow, or flame-colour, and orange. Between thefe extremes is a medium, partaking neither of the one nor the other, which is what we properly call red. Acids turn black, blue, and violet into red; and red into yellow; and yellow into a very pale yellow. Alkali's change red into violet or purple, and yellow into feuillemort or dead-leaf colour. Terreftrial and fulphureous matters become red by extreme heat; and fome at length black, as may be feen in brick, red-bole, red-chalk, flate, pumice, which, when vitrified by a burning glafs, becomes black; lobfters become red by boiling by a moderate fire, and, by a violent fire, black. Mercury and fulphur, mixed and heated over a moderate fire, make a beautiful red, called artificial cinnabar. An acid fpirit, as lemon juice, being poured on blue folution of turnfole, turns it into a beautiful red: alkali reftores it to its original blue. Filtrating the redeft wines takes from it all its red colour.

M. de la Hire obferves, that a very luminous body, viewed through a black one, always appears red; as when the fun is feen fhining through a black cloud. He adds, that many perfons, who fee all the other colours perfectly well, yet have no idea of red, and only fee it as black. Some dyers reckon feven kinds or cafts of red, viz. fcarlet red, crimfon red, madder red, half-grain red, lively orange red, and fcarlet of cochineal; but they may all be reduced to thefe three, according to the three principal drugs which produce the colours, which are vermillion, cochineal, and madder. The fine fcarlet, called fcarlet of the gobelins, is made of agarick water prepared with bran, and turned a little fourifh; woad, and fcarlet-green or vermillion; fome dyers add cochineal, and others fœnugreek, brightening it with four water, agarick, tartar, and turmerick.

Crimfon red is made with four water, tartar, cochineal, and maftick. Madder red is made with madder, to which fome add realgal and arfenick; others common falt, or other falts, with wheat flower; or agarick, with fpirit of wine with galls or turmerick. The half grain is made with agarick or four water, half fcarlet grain, half madder, and fometimes turmerick. As to the lively orange red, the ftuff muft be firft laid in yellow, then in a liquor made of goats-hair (which has been boiled feveral times with madder) and now diffolved over the fire with certain acids, as tartar, &c. The half crimfon is made of half madder, half cochineal. The fcarlet of cochineal, or Dutch fcarlet, is made with ftarch, tartar, and cochineal; after it has been firft boiled with allum, tartar, fal gemmæ, and aqua fortis, in which tin has been diffolved.

Befides thefe feven reds, which are good and allowed colours, there is alfo a Brafil red, which is difcouraged, as fading eafily. Of the feven good reds, only four have particular cafts or fhades; the madder red, the crimfon red, the lively orange red, and the fcarlet of cochineal. The cafts or fhades of crimfon are flefh colour, peach colour, carnation rofe colour, an apple-tree flower-colour. Thofe of madder are flefh colour, onion-peel colour, and flame colour. Thofe of orange are the fame as thofe of crimfon.

REDENDUM, in law, a claufe in a leafe, &c. whereby a rent is referved to the leffor.

REDDITION, in law, denotes a judicial acknowledgment that a thing in queftion belongs to the demandant.

REDDLE, or red-chalk, a red foffile ftone, ufed to make red pencils, or crayons for defigning, &c.

REDEEMABLES, in law, are lands, funds, &c. fold with a refervation of the equity of redemption.

REDEMPTION, in law, a faculty or right of re-entering upon lands, &c. that have been fold, and affigned, upon reimburfing the purchafe-money, with legal cofts.

REDEMPTION, in divinity, fignifies to buy again fomething that had been fold, by paying back the price to him that bought it, Lev. xxv. 25. and to deliver and bring out of bondage with a ftrong hand, and without any ranfom, fuch as were kept prifoners by their enemies, Deut. vii. 8. and alfo to free finners from the tyranny of Satan, from fin, death and hell, by a ranfom paid to the juftice of God: thus is Chrift both the Ranfomer and Ranfom, Luke i. 68. 1 Tim. ii. 6. Tit. ii. 14.

Redemption fometimes fignifies deliverance both from the guilt and power of fin, by forgivenefs and fanctification, Eph. i. 7. Sometimes it is taken for the whole work of a finner's falvation, comprehending all things that belong to it, Heb. ix. 12. *Having obtained eternal redemption for us.* Our whole *redemption*, from the firft act to the laft, both for merit and efficacy, is wholly from Chrift, and not at all from ourfelves. The laft act of our falvation is the refurrection of our bodies, and the fentence of the laft judgment, after which the faints fhall be glorified as the fons of God by adoption, their fouls and bodies being re-united, in this fenfe *redemption* is taken, Luke xxi. 28. Rom. viii. 23.

REDENS, REDANS, or REDANT, in fortification, a kind of work indented in the form of the teeth of a faw, with falliant and re-entering angles, that one part may flank or defend another.

REDHIBITION, in the civil law an action allowed a buyer, whereby to annul the fale of fome moveable, and oblige the feller to take it back again, upon the buyer's finding it damaged, or that there was fome perfonal cheat.

REDINTEGRATION, in the civil law, the act of reftoring a perfon to the enjoyment of a thing whereof he has been illegally difpoffeffed.

REDINTEGRATION, in chymiftry, the method of reftoring a mixed body to its original nature and conftitution, after it has been deftroyed by calcination, corrofion, &c.

REDISSEISIN, in law, a diffeifin made by him who once before was found and adjudged to have diffeifed the fame man of his lands and tenements: for which there lies a fpecial writ, called a writ of rediffeifin.

REDOUBT, in fortification, a fmall fquare fort, without any defence but in front; ufed in trenches, lines of circumvallation, contravallation, and approach; as alfo for the lodging of corps de garde, and to defend paffages.

REDUCING SCALE, a thin broad piece of box, &c. with feveral lines and fcales of equal parts thereon.

It is ufed by furveyors, &c. for reducing maps or draughts from one dimenfion into another.

REDUCT, or REDUIT, in military affairs, an advantageous piece of ground, intrenched and feparated from the reft of the place, camp, &c. for an army, garrifon, &c. to retire to in cafe of furprize.

REDUCT, or REDUX, in chymiftry, a flux, or powder, by which calcined metals, or minerals, are reduced to a regular form. See FLUX.

REDUCTION, in arithmetick, is the converting of monies, weights, or meafures, into the fame value in another denomination: as pounds into fhillings or pence; or fhillings and pence into pounds. Reduction is of two kinds, defcending and afcending.

REDUCTION *defcending*, is when a quantity is to be brought from any higher denomination into a lower. This is done by confidering how many of the next lefs denomination are contained in the next greater before it, and by that number multiplying the greater. Thus pounds are reduced into fhillings by multiplying by 20; fhillings into pence by multiplying by 12; and pence into farthings by multiplying by four. Alfo Troy pounds may be reduced into grains by multiplying by 12, 20, and 24. And avoirdupoife hundreds into ounces, by multiplying by 4, 28, and 16.

REDUCTION *afcending*, is when a lower denomination is to be brought into a higher. This is done by dividing the leaft by fo many of its denomination as are contained in the next greater. Thus 24,720 pence, divided by 12 and 20, give 103 pounds; but if any thing remain after divifion, they are the odd pence and fhillings; as 6713 pence, divided by 12 and 20, give 27l. 19s. 5d.

After the fame manner may Troy weight, avoirdupoife weight, or any other weight or meafure be reduced.

REDUCTION *of Equations*, in algebra, is the freeing them from all fuperfluous quantities, and the feparating the known from the unknown quantities, in order to reduce every refpective equation to its moft fimple terms, and bring the known quantity or quantities to one fide of the equation, and the unknown to the other.

REDUCTION *of Syllogifms*, is a regular changing or transforming an imperfect fyllogifm into a perfect one. Or, it is a change of a fyllogifm in refpect of form, whereby the neceffity of the inference is rendered more evident.

REDUCTION, in aftronomy, is the difference between the

the argument of inclination and the eccentrical longitude; or the difference of the two arches of the orbit and the ecliptick, intercepted between the node and the circle of inclination.

Reduction, in surgery, the reducing a dislocated, luxated, or fractured bone to its former place.

Reduction *of a Figure or Map*, the drawing a copy thereof, either larger or smaller than the original, still preserving the form and proportion.

REDUNDANCE, or Redundancy, a fault in writing and discourse, consisting in the use of a superfluity of words.

REDUNDANT Hyperbola, a curve of the higher kind, so called, because it exceeds the conick section of that name in the number of its hyperbolical legs; being a triple hyperbola, with six hyperbolical legs.

REDUPLICATION, in logick, a kind of condition expressed in a proposition, indicating or assigning the manner wherein the predicate is attributed to the subject.

RE-DUPLICATIVE Propositions, are such wherein the subject is repeated, with some circumstance or condition. Thus, "Men, as men, are rational: "Kings, as kings, are subject to none but God."

REEF, among seamen, signifies part of the sail rolled up, in order to make it less.

REELING, in the manufactures, the manner of winding thread, silk, cotton, or the like, from a reel into a skain, or on a bottom, to prevent its being entangled.

RE-ENTERING Angle, in fortification. See Angle.

RE-ENTRY, in law, the resuming, or taking possession of what we had lately quitted

RE-EXTENT, in law, a second extent made upon lands or tenements, on complaint that the former extent was partially made.

REFECTORY, a spacious hall in convents, and other communities, where the monks, nuns, &c. take their refections or meals.

REFERENCE, in writing, &c. a mark relative to another similar one in the margin, or bottom of the page, where something omitted in the text is added, or the subject further elucidated.

REFINING. See Assaying and Smelting.

Refining *of Sugar*. See Sugar.

REFLECTING, or Reflective *Dial*, a sort of dial which shews the hour by means of a piece of looking-glass plate, duly placed to reflect the sun's rays to the top of the ceiling, on which the hour-lines, &c. are drawn.

REFLECTION, or Reflexion, in mechanicks, the return, or regressive motion of a moving body, occasioned by the resistance which hindered it from pursuing its former direction.

Reflection *of Light*, in opticks, the return of the rays of light, after impinging on the solid parts of bodies.

General Rules of Reflection. 1. If a ray of light be reflected from a speculum of any form, the angle of incidence is ever equal to the angle of reflection. This law obtains in percussions of all kinds of bodies, and, consequently, must do so in those of light. This law is confirmed in light by an easy experiment; for the ray of the sun falling on a mirrour in a dark room, through a little hole, you will have the pleasure to see it rebound, so as to make the angle of reflection equal to that of incidence.

Hence, 1. If a ray of light falls perpendicularly on the surface of a speculum, it will be reflected back upon it. 2. From the same point of a speculum several rays cannot be reflected to the same point; for in that case all the several angles of reflection would be equal to the same angle of incidence, which is absurd. 3. One ray cannot be reflected to two or more points; for in that case all its angles of reflection would be equal to the same angle of incidence; which is as absurd as before.

2d. Each point of a speculum reflects rays falling on it from each part of an object. Hence, since several rays, coming from several parts of a radiant object, cannot be reflected from the same point of a speculum to the same point; the rays that flow from different points of the object are separate after reflection: and hence each ray shews the point whence it proceeded. On this principle it is, that the rays reflected from mirrours or looking-glasses, exhibit the appearances of objects placed before them. And hence we easily conceive, why rough bodies exhibit no images, in regard they reflect the light in such manner as to confound rays which proceed from different points, by means of their eminencies and cavities, their alternate risings and fallings: but for this, all hard bodies would be mirrours.

3d. If the eye and the radiant point change places, the point will continue to radiate upon the eye, in the same course or path as before.

4th. The plane of reflection, that is, the plane wherein the incident and reflected ray are found, is perpendicular to the surface of the speculum, and in spherical specula passes through the centre.

5th. The image of an object seen in a mirrour, is in the cathetus of incidence. This holds good, universally, in plane and spherical mirrours, and usually in concave ones, a few instances only excepted, as is shewn by Kepler. For the particular laws of reflection, arising from the circumstances of the several kinds of specula, or mirrours, plane, concave, convex, &c. see Mirrour.

Reflection is also used, figuratively, for an operation of the mind; whereby it turns its view backwards as it were upon itself, and makes itself and its own operation the object of its disquisition; and by contemplating the manner, order, and laws, which it observes in perceiving ideas, comparing them together, reasoning, &c. it frames new ideas of the relations discovered therein.

REFLEX, or Reflect, in painting, is understood of those places in a picture which are supposed to be illuminated by a light reflected from some other body, represented in the same piece.

Reflex *Vision*, that performed by means of reflected rays, as from mirrours.

REFLUX *of the Sea*, the ebbing of the water, or its returning from the shore.

REFORM, a re-establishment, or revival of formerly neglected discipline, or a correction of the reigning abuses therein.

To Reform, in a military sense, is to reduce a company, regiment, &c. either by disbanding the whole, or breaking a part, and retaining the rest.

REFORMADO, or Reformed Officer, one whose troop, or company, is suppressed in a reform, and he continued either in the whole or half-pay, doing duty in the regiment.

REFORMATION, the act of reforming or correcting [illegible] or abuse in religion, discipline, or the like.

[illegible] Reformation, so called by way of eminence, is the separation of the Protestants from the church of Rome, in the beginning and towards the middle of the 16th century.

REFRACTED, or Refractive Dial, one that shews the hours by means of some refractive transparent fluid.

REFRACTION, in mechanicks, the deviation of a moving body from its direct course, by reason of the different density of the medium it moves in; or a flexion and change of direction, occasioned by a body's falling obliquely out of one medium into another of a different density.

Refraction *of Light*, in opticks, is an inflexion or deviation of the rays of light from their rectilinear course, upon falling obliquely out of one medium into another of a different density.

Whatever substance a ray of light passes through, or if it pass through a space void of all substance; it is said, by philosophers, to pass through a medium; and, therefore, if it passes out of any substance, as air or glass, into a vacuum, or the contrary, it is said to pass out of one medium into another.

All bodies being endued with an attractive force, which is extended to some distance beyond their surfaces; when a ray of light passes out of a rarer into a denser medium, if this latter has a greater attractive force than the former, as is commonly the case, and what we shall hereafter always suppose, unless it be mentioned to the contrary, the ray, just before its entrance, will begin to be attracted towards the denser medium, and this attraction will continue to act upon it till some time after it has entered the medium, as we shall shew presently; therefore, if a ray approaches a denser medium in a direction perpendicular to its surface, its velocity will be continually accelerated during its passage through the space in

in which that attraction exerts itself; and, therefore, after it has paffed that fpace, it will move on till it arrives at the oppofite fide of the medium, with a greater degree of velocity than it had before it entered: fo that, in this cafe, its velocity only will be altered. Whereas, if a ray enters a denfer medium obliquely, it will not only have its velocity augmented thereby, but its direction will become lefs oblique to the furface, juft as when a ftone is thrown downwards obliquely from a precipice, it falls to the furface of the ground in a direction nearer to a perpendicular one, than that with which it was thrown by the hand. From hence we fee that a ray of light, in paffing out of a rarer into a denfer medium, is refracted towards the perpendicular; that is, fuppofing a line drawn perpendicularly to the furface of the medium, through the point where the ray enters, and extended both ways, the ray in paffing through the furface is refracted or bent towards the perpendicular line; or, which is the fame thing, the line which it defcribes by its motion after it has paffed through the furface, makes a lefs angle with the perpendicular, than the line it defcribed before.

It is neceffary to be remembered, that the line which a ray defcribes, before it enters a denfer or rarer medium, is called the incident ray; but that which it defcribes after it has entered, is termed the refracted ray.

The angle comprehended between the incident ray and the perpendicular, is the angle of incidence; and that between the refracted ray and the perpendicular, is the angle of refraction.

There is a certain and immutable law or rule, by which refraction is always performed, and that is this: whatever inclination a ray of light has to the furface of any medium before it enters it, the degree of refraction will always be fuch, that the proportion between the fine of the angle of its incidence, and that of the angle of its reflection, will always be the fame in that medium.

When a ray paffes out of a vacuum into air, the fine of the angle of incidence is found to be to that of refraction, as 100036 to 100000.

When it paffes out of air into water, as about 4 to 3.

When out of air into glafs, as about 17 to 11.

When out of air into a diamond, as about 5 to 2.

Refraction, in aftronomy, is an inflection of the rays of light iffuing from a heavenly body, in paffing through the atmofphere of the earth, whereby the apparent altitude of it is increafed.

If we imagine the atmofphere to be divided into any number of concentrick fpherical fpaces of different diftances, a ray of light coming from a ftar would proceed in a ftraight line till it falls upon the outward furface, there it would be a little bent, and go on from thence in a ftraight line to the next, where falling upon a furface of thicker air, it would receive a greater refraction, and go on in the ftraight line till it meets with a ftill thicker air, which would give it a new and greater refraction, and fo on. As all vifion is made in a right line, a fpectator upon the earth would fee the ftar in the refracted line continued; fo that its refracted or apparent place is higher or nearer to the zenith than its true place: refraction, therefore, makes all the heavenly bodies appear higher than their true places.

If a ftar be in the zenith of a fpectator upon the earth, a ray, coming from it to his eye, falls perpendicularly upon the fpherical furface of the atmofphere, and will therefore, proceed in a ftraight line, without being refracted. If a ftar be in the horizon of an obferver, a ray, coming from it to his eye, fuffers the greateft refraction of all, for two reafons; 1ft. The ray falls upon the furface of the atmofphere with the greateft obliquity. 2dly. It paffes through the largeft fpace of the lower and denfer part of the air.

The refraction of the heavenly bodies is not only greateft in the horizon, and none at all in the zenith, but decreafes from the horizon, as their altitudes increafe, till near the zenith it becomes fcarcely fenfible: aftronomers give us tables of refraction, which ferve chiefly for the country where they were made: the air is condenfed, and, confequently, refraction increafed by cold; and, therefore, refraction is greater in cold countries than in hot: it is alfo greater in cold weather than in hot, in the fame country.

The refractions of the heavenly bodies, as the fun, moon, and ftars, at all altitudes except very fmall ones, will be nearly as the tangents of their apparent zenith diftances, drawn into the refpective denfity of the atmofphere at the places and times for which fuch refractions are to be determined; and therefore, if the denfity be the fame, are fimply as the tangent of their apparent zenith diftances. But at very fmall altitudes the refractions may be found by this general rule:

As 1 to 9986, fo is the fine of any given apparent zenith diftance, to the fine of an arch; $\frac{2}{11}$ of the difference of which arch and the given zenith diftance is the refraction fought, which for an altitude of 5°, will come out 9′ 10″.

The refraction of the horizontal fun being the greateft, is the caufe of the fun's appearing of an oval form, at his rifing and fetting: for the lower edge of the fun is more refracted than the upper edge, by which means they are brought nearer together; that is, the perpendicular diameter fhortened, whereas reflection does not fhorten the tranfverfe diameter: moreover, the lower edge fuffering the greateft refraction, the horizontal fun does not appear a compleat ellipfis, but the lower half is part of a more oblong oval than the upper half. What has been faid of the fun, is applicable alfo to the rifing and fetting moon. For the fame reafon, if we take with an inftrument the diftance of two ftars when they are in the fame vertical, and near the horizon, we fhall find it confiderably lefs than if we meafure it when they are both at fuch a height as to fuffer little or no refraction; becaufe the lower ftar is more lifted up than the higher. There is alfo another alteration made by refraction in the apparent diftance of ftars: if two ftars are in the fame almicantar, or circle parallel to the horizon, their apparent diftance is lefs than the true; for fince refraction makes each of them higher in the vertical or azimuth in which they appear, it muft bring them into parts of the vertical, where they come nearer to one another; for fince all verticals converge fo as to meet in the zenith, it is manifeft the diftance between any two verticals is diminifhed, as they grow nearer the zenith: this contraction of diftance, according to Dr. Halley, is at the rate of, at leaft, one fecond in a degree; fo that for example, if the diftance between two ftars in a pofition parallel to the horizon meafures 30°, it is at moft to be reckoned but 29° 59′ 30″.

Refraction *of Altitude*, is an arch of a vertical circle, whereby the altitude is increafed by the refraction.

Refraction *of Declination*, is an arch of a circle of declination, whereby the declination of the object is either increafed or diminifhed by the refraction.

Refraction *of Longitude*, is an arch of the ecliptick, whereby the longitude of the object is increafed or diminifhed by the refraction.

Refraction *of Latitude*, is an arch of a circle of latitude, whereby the latitude of a heavenly object is either increafed or diminifhed by its refraction.

Refraction *in Ifland Cryftal*. There is a double refraction in this fubftance, contrary ways, whereby not only oblique rays are divided into two, and refracted into oppofite parts, but even perpendicular rays are one half refracted.

REFRANGIBILITY *of Light*, is a difpofition of the rays to be refracted.

REFRIGERATIVE, in medicine, a remedy, or diet, which cools the internal parts.

REFRIGERATORY, *Refrigeratorium*, in chymiftry, a veffel filled with water, through which the worm paffes in diftillations. Its ufe is to condenfe the vapours, as they pafs through the worm.

REFUGEES, French proteftants, who, by the revocation of the edict of Nants, in 1685, have been obliged to quit their country, and retire for refuge, into Holland, Germany, England, &c.

REGALIA, in law, the royal rights, or prerogatives of a king. Thefe are the power of judicature; power of life and death; power of war and peace; mafterlefs goods; affeffments; and minting of money.

Regalia, alfo fignifies the feveral parts of the apparatus of a coronation.

Regalia *of the Church*, are thofe rights and privileges, which cathedrals, &c. enjoy by grants, and other conceffions of kings.

REGARDANT, in heraldry, is underftood of a lion, or

or other beaſt of prey, borne in a poſture of looking behind him.

REGARDER *of a Foreſt*, an ancient officer of the king's foreſt, whoſe buſineſs was every year, upon oath, to make a regard, i. e. take a view of the foreſt limits; alſo to enquire into all offences and defaults committed by the foreſters within the foreſt, &c.

REGEL, or Rigel, a fixed ſtar of the firſt magnitude in Orion's left foot.

REGENT, *Regens*, a perſon who governs a kingdom, during the minority or abſence of a king.

Regent, is alſo uſed for a profeſſor of arts or ſcience, who holds a claſs or ſet of pupils in a college.

REGICIDE, *Regicida*, a king-killer: alſo the act itſelf of murdering a king.

REGIFUGE, *Regifugium*, a feaſt held in ancient Rome on the ſixth of the calends of March, in memory of the expulſion of their kings, particularly of Tarquin's flying out of Rome on that day.

REGIMEN, in medicine, the regulation of diet, with a view of preſerving or reſtoring health.

Regimen, in chymiſtry, the method of regulating and conducting any thing ſo as to produce the intended effect.

Regimen, in grammar, that part of ſyntax or conſtruction, which relates to the dependency of words, and the alterations which one occaſions in another.

REGIMENT, in military affairs, a body conſiſting of ſeveral troops of horſe, or companies of foot, commanded by a colonel.

REGIO Assensu, a writ, whereby the king gives his royal aſſent to the election of a biſhop.

REGION, *Regio*, in geography, a particular diviſion of the earth, or a tract of land inhabited by people of the ſame nation.

Region, in phyſiology. The atmoſphere is, by authors, divided into three ſtages, called the upper, middle, and lower regions. The upper region commences from the tops of the mountains, and reaches to the utmoſt limits of the atmoſphere. The middle region is that wherein the clouds reſide, meteors are formed, &c. extending from the extremity of the loweſt to the tops of the higheſt mountains. The loweſt region is that wherein we breathe, and is terminated by the reflection of the ſun's rays; that is, to the height to which they rebound from the earth.

Ætherial Region, the whole extent of the univerſe, including the orbs of the fixed ſtars.

REGISTER, *Regiſtrarium*, a publick book ſerving to enter and record memoirs, acts, and minutes, to be conſulted occaſionally, for juſtifying matters of facts, &c.

Register *of a Pariſh Church*, a book wherein the yearly baptiſms, marriages, and burials of each pariſh are orderly regiſtered.

Register, in printing, the diſpoſing the forms of the preſs ſo that the lines and pages printed on one ſide of the ſheet fall exactly againſt thoſe on the other.

Registers, in chymical furnaces, are air vents, by opening of which the operator regulates the fire at pleaſure: for when they are opened, the heat increaſes; when cloſed, it abates.

Register *Ships*, in commerce, ſhips which have permiſſion from the king of Spain, or council of the Indies, to traffick in the ports of the Spaniſh W. Indies.

REGIUS-Professors. King Henry VIII. founded five lectures in our univerſities, viz. of Divinity, Hebrew, Greek, Law, and Phyſick; the readers of which lectures are, in the univerſity ſtatutes, called Regii profeſſores.

Regius *Morbus*, in medicine, a name applied, by different authors, to different diſtempers. Celſus calls the jaundice by this name; ſome mean by it the king's evil, and others the epilepſy.

REGLET, in architecture, a ſmall, flat, narrow moulding, chiefly uſed in compartments and pannels, to ſeparate the members or moulds from one another, and to form knots, frets, and other ornaments.

REGULAR, the relation of any thing conformable to the rules of art.

Regular, in a monaſtery, a perſon who has taken the vows; becauſe he is bound to obſerve the rule of the order he has embraced.

Regular *Curves*, ſuch as proceed gradually in the ſame geometrical manner, with regard to their curvities.

Regular *Figure*, in geometry, a figure both equilateral and equiangular.

Regular, or *Platonick Body*, a ſolid terminated on all ſides by regular and equal planes, and whoſe ſolid angles are all equal. The ſolid bodies are the five following: 1. The tetrahedron, which is a pyramid, comprehended under four equal and equilateral triangles. 2. The hexahedron, or cube, whoſe ſurface is compoſed of ſix equal ſquares. 3. The octahedron, which is bounded by eight equal and equilateral triangles. 4. The dodecahedron, which is contained under 12 equal and equilateral pentagons. 5. The icoſihedron, conſiſting of 20 equal and equilateral triangles. Theſe five are all the regular bodies in nature.

The proportion of the five regular bodies inſcribed in the ſame circle from Peter Herigon. Curſus Math. vol. I. p. 779. and Barrow's Euclid, lib. XIII.

The diameter of the ſphere being 2.

The circumference of the greateſt circle —	6.28318
Superficies of the greateſt circle —	3.14159
Superficies of the ſphere — —	12.56637
Solidity of the ſphere — — —	4.18879
Side of the tetrahedron — —	1.62299
Superficies of a tetrahedron — —	4.6188
Solidity of a tetrahedron — —	0.15132
Side of a cube or hexahedron — —	1.1547
Superficies of the hexahedron —	8.
Solidity of the hexahedron — —	1.5366
Side of an octahedron — —	1.41421
Superficies of the octahedron —	6.9282
Solidity of the octahedron —	1.33333
Side of the dodecahedron —	0.71364
Superficies of the dodecahedron —	10.51462
Solidity of the dodecahedron — —	2.78516
Side of the icoſihedron —	1.05146
Superficies of the icoſihedron —	9.57454
Solidity of the icoſihedron —	2.53615

If one of theſe five regular bodies were required to be cut out of the ſphere of any other diameter, it would be as the diameter of the ſphere 2 is to the ſide of any one ſolid inſcribed in the ſame (ſuppoſe the cube 1.1547) ſo is the diameter of any other ſphere (ſuppoſe 8) to 4.6188, the ſide of the cube inſcribed in this latter ſphere.

Regular *Prieſt*, a prieſt in ſome religious order; in contradiſtinction to a ſecular prieſt, or one that lives in the world at large.

Regular *Places*, thoſe contained within the boundary or incloſure of the convent.

REGULATION, a rule or order preſcribed by a ſuperior, for the proper management of ſome affair.

REGULATOR *of a Watch*, the ſmall ſpring belonging to the balance; ſerving to adjuſt its motions, and make it go faſter or ſlower.

REGULUS, in chymiſtry, the metalline part of minerals, which remain in the bottom of a crucible, after the ſeparation of the ſcoriæ.

Regulus, in aſtronomy, a ſtar of the firſt magnitude in the conſtellation Leo.

REHEARSAL, in muſick and the drama, an eſſay or experiment of ſome compoſition made in private, previous to the repreſentation or performance thereof in publick; to habituate the actors or performers, and make them more ready and perfect in their parts.

REIMBURSEMENT, in commerce, the act of repaying or returning what monies a perſon had received, by way of advance, &c. or what another has diſburſed or paid for us.

REINFORCED, or Renforced *Ring*, of a cannon, is that next after the trunnions, betwixt them and the touch-hole.

REINFORCEMENT, in war, a ſupply of men, arms, ammunition, &c.

REINS, in anatomy; ſee Kidneys.

REJOINDER, in law, the defendant's anſwer to the plaintiff's replication.

REITERATION, the act of repeating a thing, or doing it a ſecond time.

RELAPSE, a return, or falling again in a danger or evil, out of which a perſon had eſcaped.

RELATION, *Relatio*, in philoſophy, the mutual reſpect of two things; or what each is with regard to the other.

The nature of relation conſiſts in the referring or comparing two things one to another, from which compariſon,

parifon, one or both come to be denominated; and if either of thofe things be removed, or ceafes to be, the relation ceafes, and the denomination confequent to it, though the other receive, in itfelf, no alteration at all. V. g. Cajus, whom I confider to day as a father, ceafes to be fo to-morrow, only by the death of his fon, without any alteration made in himfelf; nay, barely by the mind's changing the object to which it compares any thing, the fame thing is capable of having contrary denominations at the fame time. V. g. Cajus, compared to feveral perfons, may truly be faid to be older and younger, ftronger and weaker, &c.

RELATION, in logick, an accident of fubftance accounted one of the 10 categories or predicaments.

RELATION, in geometry, arithmetick, &c. is the habitude or refpect of two quantities to one another with regard to their magnitude.

RELATION, in grammar, is the correfpondence which words have to one another in conftruction.

RELATIVE, fomething relating to, or refpecting, another.

RELATIVE *Terms*, in logick, are words which imply a relation: fuch as mafter and fervant, hufband and wife, &c.

RELAXATION, in medicine, the act of loofening or flackening, or the loofenefs and flacknefs of the fibres, nerves, mufcles, &c.

RELAY, a fupply of horfes placed on the road, and appointed to be ready for a traveller to change, in order to make the greater expedition.

RELAY, in tapeftry, is an opening left, where the colours and figures are to be changed, when the piece is finifhed.

RELEASE, in law, is an inftrument in writing, by which eftates, rights, titles, entries, actions, and other things, are extinguifhed and difcharged; and fometimes transferred, abridged, or enlarged: and in general, it fignifies one perfon's giving up or difcharging the right of action he has, or claims to have, againft another, or his lands, &c.

RELICKS, in the Romifh church; the remains of the bodies or cloaths of faints or martyrs, and the inftruments by which they were put to death, devoutly preferved in honour to their memory; kiffed, revered, and carried in proceffion. This is a piece of fuperftition which began very early in the Chriftian church, and at prefent makes no inconfiderable article of popery.

RELICT, in law, the fame with widow, which fee.

RELIEVE, in a military fenfe, is to fend off thofe men that are upon duty, and to bring others to take their place: thus, to relieve the guard, the trenches, &c. is to bring frefh men upon duty, and to difcharge thofe who were upon duty before.

RELIEVO, or RELIEF, in fculpture, &c. is the projecture or ftanding out of a figure, which arifes prominent from the ground or plan on which it is formed; whether that figure be cut with a chiffel, moulded, or caft. There are three kinds or degrees of relievos, viz. alto, baffo, and demi-relievo. The alto-relievo, called alfo haut-relief, or high-relievo, is when the figure is formed after nature, and projects as much as the life. Baffo-relievo, bafs-relief, or low relievo, is when the work is raifed but a little from the ground, as in medals, and the frontifpieces in buildings; and particularly in the hiftories, feftoons, foliages, and other ornaments of friezes. Demi-relievo, is when one half of the figures rifes from the plan. When, in a baffo-relievo, there are parts that ftand clear out, detached from the reft, the work is called a demi-baffo.

In architecture, the relievo or projecture of the ornaments, ought always to be proportioned to the magnitude of the building it adorns, and to the diftance at which it is to be viewed.

RELIEVO, or *Relief*, in painting, is the degree of boldnefs with which the figures feem, at a due diftance, to ftand out from the ground of the painting.

The relievo depends much upon the depth of the fhadow, and the ftrength of the light; or on the height of the different colours, bordering on one another; and particularly on the difference of the colour of the figure from that of the ground: thus, when the light is fo difpofed as to make the neareft parts of the figures advance, and is well diffufed on the maffes, yet infenfibly diminifhing, and terminating in a large fpacious fhadow, brought off infenfibly, the relievo is faid to be bold, and the clair obfcure well underftood.

RELIGION, is taken, (1.) for the external and ceremonial worfhip of the Jews, as it was corrupted by the traditions of the Pharifees, Acts xxvi. 5. (2.) For the true religion, even that inward piety of the heart, whereby God is truly acknowledged, feared, and loved, and which inclines perfons to perform all duties of love or charity towards thofe that are in diftrefs, efpecially for religion. Jam. i. 27. (3.) For fuperftition, Col. ii. 28. *Let no man beguile you of your reward, in worfhipping of angels*: in the *Greek* it is, *εν θρησκεια των αγγελων, in the religion of angels.* Do not imitate thofe who affect to humble themfelves before the angels, and to pay them a fuperftitious worfhip. A caution this, not more feafonable and neceffary in the apoftle's time, than it is this day to us.

RELIGIOUS, in popifh countries, is particularly ufed for a perfon engaged, by folemn vows, to the monaftick life: or a perfon fhut up in a monaftery to lead a life of devotion and aufterity, under fome rule or inftitution.

REMAINDER, in law, is an eftate in lands, tenements, or rents, not to be enjoyed till after a term of years, or another perfon's deceafe: thus, a perfon grants lands or tenements to one perfon for a term of years, or for life, and the remainder to another perfon for life, or in fee.

REMAINDER, in mathematicks, is what is left after taking a lefs number out of a greater.

REMINISCENCE, *Reminifcentia*, that power of the human mind, whereby it recollects itfelf, or calls again into its remembrance fuch ideas or notions as it had really forgot: in which it differs from memory, which is a treafuring up of things in the mind, and keeping them there without forgetting them. See MEMORY.

REMISSION, in phyficks, the abatement of the power or efficacy of any quality, in oppofition to the increafe of the fame, which is called intenfion. In all qualities, capable of intenfion and remiffion, the intenfion decreafes reciprocally as the fquares of diftances from the centre of the radiating quality increafe.

REMISSION, in medicine, is when a diftemper abates, but does not go quite off before it returns again, as is common in fevers, which do not quite intermit.

REMISSION, in law, &c. denotes the pardon of a crime, or the giving up the punifhment due thereto.

REMITTANCE, in commerce, the traffick or return of money from one place to another, by bills of exchange, orders, or the like.

This word is alfo ufed in fpeaking of the payment of a bill of exchange. It alfo fignifies the fee or reward given a banker, both of his wages and the different value of the fpecies in the places where you pay the money and where he remits it.

REMITTER, in law. Where a perfon has two titles to lands, &c. and he comes to fuch lands by the laft title, which proving defective, he fhall be reftored to, and adjudged in, by virtue of his former more antient title, this is called remitter.

REMONSTRANCE, an expoftulation or humble fupplication, addreffed to a king, or other fuperior, befeeching him to reflect on the inconveniencies, or ill confequences of fome order, edict, or the like.

This word is alfo ufed for an expoftulary counfel, or advice; or a gentle and handfome reproof, made either in general or particular, to apprize or correct fome fault, &c.

REMOUNT, in war. To remount the cavalry, is to furnifh troopers or dragoons with frefh horfes, inftead of fuch as have been killed or difabled in the fervice.

RENAL, fomething belonging to the reins or kidneys. See KIDNEYS.

RENCOUNTER, in the military art, an engagement of two little bodies or parties of forces; in which fenfe it ftands in oppofition to a pitched battle.

RENCOUNTRE, or RENCONTRE, in heraldry, is applied to animals when they fhew the head in front, with both eyes, &c. or when the face ftands right forward, as if they came to meet the perfon before them.

RENDEZVOUS, or RENDEVOUS, a place appointed to meet in, at a certain day and hour.

RENEGATE, or RENEGADO, a perfon who has apoftatized

apoſtatized or renounced the Chriſtian faith, to embrace ſome other religion, particularly Mahometaniſm.

RENIFORM, ſomething reſembling the figure or ſhape of the kidneys. See KIDNEYS.

RENITENCY, *Renitentia*, among philoſophers, that force in ſolid bodies, whereby they reſiſt the impulſe of other bodies, or re-act as much as they are acted on. See REACTION, &c.

RENT, *Reditus*, in law, a ſum of money, or other conſideration, iſſuing yearly out of lands or tenements.

RENTAL, ſignifies a roll in which the rents of manors are ſet down, in order for the lord's bailiff, thereby to collect the ſame. It contains the lands let to each tenant, with their names, and the ſeveral rents ariſing.

RENUNCIATION, *Renunciatio*, the act of renouncing, abdicating, or relinquiſhing any right, real or pretended.

REPAIRING, or REPARATION, *Reparatio*, the act of retrieving, mending, or eſtabliſhing a building or other work damaged or gone to decay. In reſpect to reparations, if a tenant or leſſee covenants that from and after the amendment of the tenements by the leſſor, he will, at his own charge, keep and leave them in repair, in that caſe the leſſee is not obliged to do the ſame until the leſſor has firſt made good the reparations; and here if a houſe be well repaired at firſt, when the leaſe began, and afterwards decays, it is ſaid the landlord muſt put it in repair before the tenant is bound to keep it ſo.

REPARTEE, or REPARTY, a ready ſmart reply, eſpecially in matters of wit, humour, or raillery.

REPARTITION, a dividing or ſharing a thing a ſecond time.

REPEALING, in law, the revoking or annulling of a ſtatute, or the like. See the articles ABROGATION and REVOCATION.

REPEAT, in muſick, a character ſhewing that what was laſt played or ſung muſt be repeated or gone over again.

REPELLENT, *Repellens*, in medicine, a remedy which repels or drives back a morbid humour into the maſs of blood, from whence it was unduly ſecreted.

To underſtand rightly the operation of ſuch medicines, it may be neceſſary to obſerve, that by repelling are meant thoſe means which preſent ſuch an afflux of a fluid to any particular part as would raiſe it into a tumour: but, to know how this may be effected, it will be convenient to attend to the ſeveral cauſes which can produce a ſwelling, or force out of the veſſels any of their fluid contents by ſome unnatural diſcharge.

REPELLING POWER, in philoſophy, is a certain power, or faculty, reſiding in the minute particles of natural bodies, whereby, under certain circumſtances, they mutually fly from one another.

REPERCUSSION, in mechanicks. See the article REFLECTION.

REPERCUSSION, in muſick, a frequent repetition of the ſame ſound. See REPETITION.

REPERTORY, *Repertorium*, a place wherein things are orderly diſpoſed, ſo as to be eaſily found when wanted. The indices of books are repertories, ſhewing where the matters ſought for are treated of. Common-place books are alſo kinds of repertories.

REPETITION, *Repetitio*, the reiterating of an action.

REPETITION, in muſick, denotes a reiterating or playing over again the ſame part of a compoſition, whether it be a whole ſtrain, part of a ſtrain, or double ſtrain, &c. The repetition is denoted by a character called a repeat, which is varied ſo as to expreſs the various circumſtances of a repeat.

REPETITION, in rhetorick, a figure which gracefully and emphatically repeats either the ſame word, or the ſame ſenſe in different words.

REPLANTING, in gardening, the act of planting a ſecond time

REPLETION, in medicine, a plenitude or plethora. See PLETHORA. Repletion is more dangerous than inanition. Bleeding and diet are the great reſources whence a perſon is incommoded with a repletion. Repletion is ſometimes alſo uſed where the ſtomach is overloaden with too much eating or drinking. The phyſicians hold all repletion to be prejudicial, but that of bread is of all others the worſt.

REPLETION, in the cannon law, is where the revenue of a benefice or benefices is ſufficient to fill or occupy the whole right or title of the graduate who holds them. Where there is a repletion, the party can demand no more by virtue of his degrees. In England, where benefices are not appropriated to degrees, repletion, ſtrictly ſpeaking, has no place.

REPLEVIN, in law, a remedy granted on a diſtreſs, by which the firſt poſſeſſor has his goods reſtored to him again, on his giving ſecurity to the ſheriff that he will purſue his action againſt the party diſtraining, and return the goods or chattels, if the taking them ſhall be adjudged lawful.

REPLEVY, in law, is a tenant's bringing a writ of replevin, or replegiari facias, where his goods are taken by diſtreſs for rent; which muſt be done within five days after the diſtreſs, otherwiſe at the five days end, they are to be appraiſed and ſold. 2 W. and M. c. 5.

This word is alſo uſed for bailing a perſon, as in the caſe of a homine replegiando.

REPLICATION, in logick, the aſſuming or uſing the ſame term twice in the ſame propoſition.

REPORT, the relation made upon oath, by officers or perſons appointed to viſit, examine, or eſtimate the ſtate, expences, &c. of any thing.

REPORT, in law, is a publick relation of caſes judicially argued, debated, reſolved, or adjudged in any of the king's courts of juſtice, with the cauſes and reaſons of the ſame, as delivered by the judges.

REPOSE, in painting, certain maſſes or large aſſemblages of light and ſhade, which being well conducted, prevent the confuſion of objects and figures, by engaging and fixing the eye ſo as it cannot attend to the other parts of the painting for ſome time; and thus leading it to conſider the ſeveral groups gradually proceeding, as it were from ſtage to ſtage.

REPOSITORY, a ſtore houſe or place in which things are laid up and preſerved. In this ſenſe we ſay, the repoſitory of the royal ſociety. See MUSEUM.

REPRESENTATION, in the drama, the exhibition of a theatrical piece, together with the ſcenes, machines, &c.

REPRESENTATIVE, one who perſonates or ſupplies the place of another, and is inveſted with his right and authority. Thus the Houſe of Commons are the repreſentatives of the people in parliament. See the article PARLIAMENT.

REPRIEVE, or REPRIVE, in law, is ſuſpending or deferring the execution of the law upon a priſoner for a certain time: or a warrant from the king for deferring the execution of a perſon condemned.

REPRISALS, a right which princes claim of taking from their enemies any thing equivalent to what they unjuſtly detain from them.

Repriſals is alſo uſed for a letter of marque granted by a prince to his ſubject. See MARQUE.

REPRISE, or REPRIZE, at ſea, is a merchant-ſhip which, after its being taken by a corſair, privateer, or other enemy, is retaken by the oppoſite party.

REPRISES, in law, are deductions or payments annually made out of a manor or lands; as rent-charges, penſions, annuities, &c.

REPROBATION, in theology, is generally underſtood of the decree and purpoſe of God, to abandon the wicked to the greateſt of evils, by not delivering them out of that maſs of corruption, in which all mankind are involved by nature; and in not affording them the graces neceſſary to their arriving at eternal happineſs: God does not reprobate men by making them wicked; but by not granting them the benefits of his gratuitous mercy.

Reprobates, whom God hath in his JUSTICE appointed to deſtruction, he hath decreed, either, 1. To afford them neither the extraordinary, nor ſo much as the outward and ordinary means of faith: or elſe, 2. In preſence of the outward means of the word and ſacraments, to withhold the inward concurrence of his enlightening and renewing Spirit to work with thoſe means. For want whereof, they [the outward means] become *ineffectual* to them [viz. to the reprobate] for their good; working upon them either *malignantly*, ſo as their hearts are *the* MORE *hardened* thereby in ſin and unbelief; or *infirmly*, ſo as *not to work* in them a perfect converſion: but to produce (inſtead of the gracious habits of ſanctification, as faith, repentance, charity, humility, &c.) ſome weak and infirm *ſhadows* of thoſe graces: which, for their

their formal femblance fake, do fometimes bear the *name* of thofe graces they refemble, but were *never*, in the mean time, the very *true* graces themfelves; and, in the end, are *difcovered to have been* FALSE, *by the want of* PERSEVERANCE.

"Reprobation, fays *Peter Martyr*, is that moft wife determination of God, whereby he did, before all eternity, immutably decree, not to have mercy on thofe, whom he loved not, but paffed by:" and that without any *injuftice* on his part. Nor does this doctrine, as fome ignorantly infer, make God the author of fin; therefore he adds, "There is no need for God to infufe additional evil into our hearts. There is enough there already. We have fufficiently of ourfelves: partly, through the foulnefs of original fin; and, partly, becaufe a created being doth, of himfelf, degenerate, without meafure and without end, unlefs he is fuccoured by God."

REPRODUCTION, the act whereby a thing is produced anew, or grows a fecond time.

The reproduction of feveral parts of lobfters, crabs, &c. is one of the greateft curiofities in natural hiftory. It feems, indeed, inconfiftent with the modern fyftem of generation, which fuppofes the animal to be wholly formed in the egg, that, in lieu of the organical part of an animal cut off, another fhould arife perfectly like it: the fact, however, is too well attefted to be denied. The legs of lobfters, &c. confift each of five articulations; now when any of the legs happen to break, by any accident, as by walking, &c. which frequently happens, the fracture is always found to be at the future near the fourth articulation; and what they thus lofe is exactly reproduced in fome time afterwards; that is, a part of the leg fhoots out, confifting of four articulations, the firft whereof has two claws, as before; fo that the lofs is entirely repaired.

If the leg of a lobfter be broke off by defign at the fourth or fifth articulation, what is thus broke off is always reproduced. But, if the fracture be made in the firft, fecond, or third articulation, the reproduction is not fo certain. And it is very furprizing, that if the fracture be made at thefe articulations, at the end of two or three days, all the other articulations are generally found broke off to the fourth, which, it is fuppofed, is done by the creature itfelf, to make the reproduction certain. The part reproduced is not only perfectly fimilar to that retrenched, but alfo in a certain fpace of time grows equal to it. Hence it is that we frequently fee lobfters, which have their two large legs unequal, in all proportions. And, if the part reproduced be broke off, a fecond will fucceed.

REPTILES, in natural hiftory, a kind of animals denominated from their creeping or advancing on the belly. Or reptiles are a genus of animals and infects, which, inftead of feet, reft on one part of the body, while they advance forward with the reft. Such are earthworms, fnakes, caterpillars, &c. Indeed, moft of the clafs of reptiles have feet; only thofe very fmall, and the legs remarkably fhort in proportion to the bulk of the body.

REPTILE, is alfo ufed by fome botanical writers, to fignify plants which creep upon the earth, unlefs fuftained by fome other plant, prop, &c. as cucumbers, melons, the vine, &c.

REPUBLICK, *Republica*, commonwealth, a popular ftate or government; or a nation where the people have the government in their own hands.

REPUBLICK *of Letters*, a phrafe ufed collectively of the whole body of the people of ftudy and learning.

REPUDIATION, *Repudium*, in the civil law, the act of divorcing.

REPULSION, *Repulfio*, in phyficks, that property in bodies, whereby, if they are placed juft beyond the fphere of each other's attraction of cohefion, they mutually fly from each other.

Thus, if an oily fubftance, lighter than water, be placed on the furface thereof, or if a piece of iron be laid upon mercury, the furface of the fluid will be depreffed about the body laid on it: this depreffion is manifeftly occafioned by a repelling power in the bodies, which hinders the approach of the fluid towards them. But it is poffible, in fome cafes, to prefs or force the repelling bodies into the fphere of one another's attraction; and then they will mutually tend toward each other, as when we mix oil and water till they incorporate.

REQUEST, in law, a fupplication or petition preferred to a prince, or to a court of juftice; begging relief in fome confcionable cafes where the common law grants no immediate redrefs.

Court of REQUESTS; this was an ancient court of equity, inftituted about the 19th year of Henry VII. of like nature, though of inferior authority, with the court of Chancery; being appointed chiefly for the relief of petitioners who in confcionable cafes fhould addrefs themfelves, by way of requeft, to his majefty.

The chief judge of this court was the lord privy-feal, affifted by the mafters of Requeft, who correfponded to our mafters of Chancery. In the 40th and 41ft years of queen Elizabeth, it was adjudged, upon folemn argument, in the court of Common-pleas, that the court of Requeft was then no court of equity.

RESCEIT, *Receptio*, in law, an admiffion or receiving of a third perfon to plead his right, in a caufe formerly commenced between the other two.

RESCISION, *Refcifio*, in the civil law, an action intended for the annulling, or fetting afide, any contract, deed, &c.

RESCOUS, or RESCUE, in law, an illegal taking away and fetting at liberty a diftrefs taken, or a perfon arrefted, by procefs, or courfe of law.

RESCOUS, in matters relating to treafon, is deemed treafon; and, in matters concerning felony, is felony.

RESCRIPT, *Refcriptum*, an anfwer delivered by an emperor or a pope, when confulted by particular perfons, on fome difficult queftion, or point of law; to ferve as a decifion thereof.

RESEARCH, a fcrutiny, or diligent enquiry into any thing.

RESEARCH, in mufick, a kind of prelude or voluntary played on the organ, &c. wherein the performer feems to fearch or look out for the ftrains and touches of harmony, which he is to ufe in the regular piece to be played afterwards.

RESEARCHING, in fculpture, the repairing of a caft figure, &c. with proper tools; or the finifhing it with art and exactnefs, fo as the minuteft parts may be well defined.

RESERVATION, in law, an action or claufe whereby fomething is refenced, or fecured to one's felf.

Mental RESERVATION, a propofition, which, ftrictly taken, and according to the natural import of the terms, is falfe; but, if qualified by fomething concealed in the mind, becomes true.

Body of RESERVE, or *Corps de* RESERVE, in military affairs, the third or laft line of an army, drawn up for battle; fo called, becaufe they are referved to fuftain the reft, as occafion requires; and not to engage but in cafe of neceffity.

RESERVOIR, a place where water is collected and referved, in order to be conveyed to diftant places through pipes, or fupply a fountain, or jet d'eau.

RESET, in law, the receiving or harbouring an outlawed perfon.

RESIDENCE, in the canon and common law, the abode of a perfon, or incumbent, upon his benefice; and his affiduity in attending on the fame.

RESIDENT, a publick minifter, who manages the affairs of a kingdom or ftate, at a foreign court. They are a clafs of publick minifters inferior to ambaffadors, or envoys; but, like them, are under the protection of the law of nations.

RESIDENTIARY, *Refidentiarius*, a canon inftalled into the privileges and profits of refidence.

RESIDUAL FIGURE, in geometry, the figure remaining after fubtracting a leffer from a greater.

RESIDUAL *Root*, in algebra, a root compofed of two parts or members, connected together by the fign —.

Thus $x-y$ is a refidual root, fo called, becaufe its value is no more than the difference between it parts x and y.

RESIDUE, *Refiduum*, the remainder or balance of an account, debt, or obligation.

RESIGNATION, in the canon law, the furrendering a benefit into the hands of the collator, or bifhop.

RESIGNEE, in law, the party to whom a thing is refigned.

RESIN, *Refina*, a fat vifcid fulphureous juice, oozing either fpontaneoufly, or by incifion, from feveral trees, &c.

Refins confift of oil and acid, and accordingly are artificially

ficially produced. They are either solid or liquid, but these differ from one another only in the proportion of earth that enters their composition.

RESISTANCE, or RESISTING *Force*, in philosophy, denotes, in general, any power which acts in an opposite direction to another, so as to destroy or diminish its effect. Hence the force wherewith bodies, moving in fluid mediums, are impeded or retarded, is the resistance of those fluids. See FLUID.

The resistance of bodies of different figures, moving in one and the same medium, has been considered by Mr. J. Bernouli in the Acta Lipsiens. for May 1693; and the rules he lays down, on this subject, are the following: 1. If an isosceles triangle be moved in the fluid according to the direction of a line which is normal to its base; first with the vertex foremost, and then with its base; the resistances will be as the legs, and as the square of the base, and as the sum of the legs. 2. The resistance of a square moved according to the direction of its side, and of its diagonal, is as the diagonal to the side. 3. The resistance of a circular segment (less than a semi-circle) carried in a direction perpendicular to its basis, when it goes with the base foremost, and when with its vertex foremost (the same direction and celerity continuing, which is all along supposed) is as the square of the diameter to the same, less one third of the square of the base of the segment.

Cor. Hence the resistances of a semi-circle, when its base, and when its vertex go foremost, are to one another in a sesquialterate ratio. 4. A parabola moving in the direction of its axis, with its basis, and then its vertex foremost, has its resistance, as the tangent to an arch of a circle, whose diameter is equal to the parameter, and the tangent equal to half the basis of the parabola. 5. The resistances of an hyperbola, or the semi-ellipsis, when the base and when the vertex go foremost, may be thus computed; let it be, as the sum, or difference, of the transverse axis, and latus rectum, is to the transverse axis, so is the square of the latus rectum to the square of the diameter of a certain circle; in which circle apply a tangent equal to half the basis of the hyperbola or ellipsis. Then say again, as the sum, or difference, of the axis and parameter is to the parameter, so is the aforesaid tangent to another right line. And further, as the sum, or difference, of the axis and parameter is to the axis, so is the circular arch, corresponding to the aforesaid tangent, to another arch. This done, the resistance will be as the tangent to the sum, or difference of the right line thus found, and that arch last mentioned. 6. In general, the resistances of any figure whatsoever going now with its base foremost, and then with its vertex, are as the figures of the basis to the sum of all the cubes of the cements of the basis divided by the squares of the elements of the curve line.

All which rules, he thinks, may be of use in the fabrick or construction of ships, and in perfecting the art of navigation universally. As also for determining the figures of the balls or pendulums for clocks. See SHIP, &c.

As to the resistance of the air, Mr. Robins, in his new principles of gunnery, took the following method to determine it: he charged a musket-barrel three times successively with a leaden ball $\frac{3}{4}$ of an inch diameter, and took such precaution in the weighing of the powder, and placing it, as to be sure, by many previous trials, that the velocity of the ball could not differ by 20 feet in 1″ from its medium quantity. He then fired it against a pendulum, placed at 25, 75, and 125 feet distance, &c. from the mouth of the piece respectively. In the first case it impinged against the pendulum with a velocity of 1670 feet in 1″; in the second case with a velocity of 1550 feet in 1″; and in the third case with a velocity of 1425 feet in 1″; so that in passing through 50 feet of air, the bullet lost a velocity of about 120, or 125 feet in 1″; and the time of its passing through that space being about $\frac{1}{32}$ or $\frac{1}{30}$ of 1″, the medium quantity of resistance, must, in these instances, have been about 120 times the weight of the ball; which, as the ball was nearly $\frac{1}{12}$ of a pound, amounts to about 10lb. avoirdupoise.

Again, charging the same piece with equal quantities of powder, and balls of the same weight, and firing three times at the pendulum, placed at 25 feet distance from the mouth of the piece, the medium of the velocities with which the ball impinged was 1690 feet 1″. Then removing the piece 175 feet from the pendulum, the velocity of the ball, at a medium of five shots, was 1300 feet in 1″. Whence the ball, in passing through 150 feet of air, lost a velocity of about 390 feet in 1″; and the resistance computed from these numbers, comes out something more than in the preceding instance, amounting to between 11 and 12 lb. avoirdupoise: whence, according to these experiments, the resisting power of the air to swift motions is greater than in slow ones, in a ratio which approaches nearer to the ratio of 3 to 1, than in the preceding experiments.

Having thus ascertained the resistance to a velocity of near 1700 feet in 1″, he next proceeded to examine this resistance in smaller velocities: the pendulum being placed at 25 feet distance, was fired at five times, and the mean velocity with which the ball impinged was 1180 feet in 1″. Then removing the pendulum to the distance of 250 feet, the medium velocity of five shot at this distance, was 950 feet in 1″; whence the ball, in passing through 225 feet of air, lost a velocity of 230 feet in 1″, and as it passed through that interval in about $\frac{3}{14}$ of 1″, the resistance to the middle velocity will come out to be near $33\frac{1}{2}$ times the gravity of the ball, or 2 lb. 10 oz. avoirdupoise. Now the resistance to the same velocity, according to the laws observed in slower motions, amounts to $\frac{7}{11}$ of the same quantity; whence in a velocity of 1065 feet in 1″, (the medium of 1180 and 950) the resisting power of the air is augmented in no greater proportion than of 11 to 7; whereas in greater degrees of velocity, as before, it amounted very near to the ratio of 3 to 1.

The resistance of a bullet of three quarters of an inch diameter, moving in air with a velocity of 1670 feet in 1″, amounting, as we said, to 10 lb. the resistance of a cannon ball of 24 lb. fired with its full charge of powder, and thereby moving with a velocity of 1650 feet in 1″, may hence be determined. For the velocity of the cannon ball being near the same as the musket bullet, and its surface above 54 times greater, it follows, that the resistance on the cannon ball will amount to more than 540 lb. which is near 23 times its own weight. And from hence it appears how rash and erroneous the opinion of those is, who neglect the consideration of the resistance of the air as of no importance in the doctrine of projectiles.

RESISTANCE *of the Fibres of solid Bodies*. To conceive the idea of this resistance, or renitency of the parts, suppose a cylindrical body suspended vertically by one end. Here all its parts being heavy, draw downwards, and tend to separate the two contiguous planes, where the body is the weakest; but all the planes resist this separation by the force wherewith they cohere, or are bound together: here then are two opposite powers; viz. the weight of the cylinder which tends to break it, and the force of cohesion of the parts which resist the fracture.

If the base of the cylinder be increased, without increasing its length; it is evident the resistance will be increased in the same ratio as the base: but the weight also increases in the same ratio; whence it is evident that all cylinders of the same matter and length, whatever their bases be, have an equal resistance, when vertically suspended.

If the length of the cylinder be increased without increasing the base, its weight is increased without increasing its resistance; consequently the lengthening it weakens it. To find the greatest length a cylinder of any matter may have without breaking, there needs nothing but to take any cylinder of the same matter, and fasten it to the greatest weight it will sustain before it break: and then see how much it must be lengthened by the addition of its weight, till it equals its former weight with the addition of a foreign weight.

If one end of the cylinder were fixed horizontally into a wall, and the rest suspended thence, its weight and resistance would then act in a different manner; and, if it broke by the action of its weight, the rupture would be at the end fixed into the wall. A circle or plane contiguous to the wall, and parallel to the base, and consequently vertical, would be detached from the contiguous circle within the plane of the wall, and would descend. All the motion is performed on the lowest extremity of the diameter, which remains immoveable, while the upper extremity describes a quadrant of a circle, and till the circle which before was vertically become horizontal; i. e. till the cylinder be entirely broken.

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In this fracture of the cylinder it is visible two forces have acted, and the one has overcome the other: the weight of the cylinder, which arose from its whole mass, has overcome the resistance which arose from the largeness of the base; and as the centres of gravity are points wherein all the forces arising from the weights of the several parts of the same bodies, are conceived to be united, one may conceive the weight of the whole cylinder applied in the centre of gravity of its mass, i. e. in a point in the middle of its axis; and the resistance of the cylinder applied in the centre of gravity of its base, i. e. in the centre of the base: it being the base which resists the fracture.

The weight required to break a body placed horizontally being always less than that required to break it in a vertical situation; and this weight being to be greater or less according to the ratio of the two arms of the lever; the whole theory is always reducible to this, viz. to find what part of the absolute weight the relative weight is to be, supposing the figure of the body known, which indeed is necessary, because it is the figure that determines the two centres of gravity, or the two arms of the lever. For if the body, e. g. were a cone, its centre of gravity would not be in the middle of its axis, as in the cylinder; and if it were a semiparabolical solid, neither its centre of gravity would be in the middle of its length or axis, nor the centre of gravity of its base in the middle of the axis of its base. But still, wheresoever these centres fall in the several figures, it is these that regulate the two arms of the lever.

It may be observed here, that if the base, whereby the body is fastened into the wall, be not circular, but, e. g. parabolical, and the vertex of the parabola a-top, the motion of the fracture will not be on an immoveable point, but on a whole immoveable line, which may be called the axis of equilibrium; and it is with regard to this, that the distance of the centres of gravity are to be determined.

Now, a body, horizontally suspended, being supposed such, as that the smallest addition of weight would break it; there is an equilibrium between its positive and relative weight; and, of consequence, their two opposite powers are to each other reciprocally as the arms of the lever to which they are applied. On the other hand, the resistance of a body is always equal to the greatest weight which it will sustain in a vertical situation without breaking, i. e. is equal to its absolute weight. Therefore, substituting the absolute weight for the resistance, it appears that the absolute weight of a body, suspended horizontally, is to its relative weight as the distance of its centre of gravity of its base from the same axis.

The discovery of this important truth, at least of an equivalent hereto, and to which this is reducible, we owe to Galileo. From this fundamental proportion are easily deduced several consequences. As for instance, that if the distance of the centre of gravity of the base from the axis of equilibrium, be half the distance of the centre of gravity of the body; the relative weight will only be half the absolute weight; and, that a cylinder of copper horizontally suspended, whose length is double the diameter, will break, provided it weigh half what a cylinder of the same base, 4801 fathoms long, weighs. On this system of resistance of Galileo, M. Mariotte made a very subtle remark, which gave birth to a new system. Galileo supposes that, where the body breaks, all the fibres break at once; so that the body always resists with its whole absolute force; i. e. with the whole force all its fibres have, in the place where it is broke. But, M. Mariotte finding that all bodies, even glass itself, bend before they break, shews that fibres are to be considered as so many little bent springs, which never exert their own force till stretched to a certain point, and never break till entirely unbent. Hence those nearest the axis of equilibrium, which is an immoveable line, are stretched less than those further off, and of consequence employ a less part of their force.

This consideration only takes place in the horizontal situation of the body: in the vertical, the fibres of the base all break at once; so that the absolute weight of the body must exceed the united resistance of all its fibres: a greater weight is therefore required here, than in the horizontal situation; i. e. a greater weight is required to overcome their united resistance, than to overcome their several resistances one after another. The difference between the two situations arises hence, that in the horizontal there is an immoveable point or line, a centre of motion, which is not in the vertical.

M. Varignon has improved on the system of M. Mariotte, and shewn that to Galileo's system it adds the consideration of the centre of percussion. The comparison of the centres of gravity with the centres of percussion afford a fine view, and set the whole doctrine in the most agreeable light.

In each system, the base whereby the body breaks, moves on the axis of equilibrium, which is an immoveable line in the same base; but, in the second, the fibres of this base are continually stretching more and more, and that in the same ratio, as they recede further and further from the axis of equilibrium, and, of consequence, are still exerting a greater and greater part of their whole force.

These unequal extensions, like all other forces, must have some common centre where they all meet, and with regard to which they make efforts on each side: and as they are precisely in the same proportion as the velocities which the several points of a rod moved circularly would have to one another; the centre of extension of the base, whereby the body breaks, or tends to break, must be the same with its centre of percussion. Galileo's hypothesis, where fibres stretch equally, and break all at once, corresponds to the case of a rod moving parallel to itself, where the centre of extension or percussion does not appear, as being confounded with the centre of gravity.

The base of fraction being a surface whose particular nature determines its centre of percussion, it is necessary to be first known to find on what point of the vertical axis of that base it is placed, and how far it is from the axis of equilibrium. Indeed, we know in the general, that it always acts with so much more advantage as it is further from it, in regard it acts by a longer arm of a lever; and of consequence it is the unequal resistance of the fibres in M. Mariotte's hypothesis, which produces the centre of percussion; but this unequal resistance is greater or less, according as the centre of percussion is placed more or less high on the vertical axis of the base, in the different surfaces of the base of the fracture.

To express this unequal resistance, accompanied with all the variations it is capable of, regard must be had to the ratio between the distance of the centre of percussion from the axis of equilibrium, and the length of the vertical axis of the base. In which ratio, the first term, or the numerator, is always less than the second or the denominator: so that the ratio is always a fraction less than unity; and the unequal resistance of the fibres in M. Mariotte's hypothesis, is so much the greater, or which amounts to the same, approaches so much nearer to the equal resistance in Galileo's hypothesis, as the two terms of the ratio are nearer to an equality.

Hence it follows, that the resistance of bodies, in M. Mariotte's system, is to that in Galileo's, as the least of the terms in the ratio is to the greatest. Hence, also, the resistance being less than what Galileo imagined, the relative weight must also be less; so that the proportion already mentioned between the absolute and relative weight cannot subsist in the new system, without an augmentation of the relative weight, or a diminution of the absolute weight: which diminution is had by multiplying the weight by the ratio, which is always less than unity. This done, we find that the absolute weight, multiplied by the ratio, is to the relative weight, as the distance of the centre of gravity of the body from the axis of equilibrium is to the distance of the centre of gravity of the base of fracture from the same axis. Which is precisely the same thing with the general formula given by M. Varignon, for the system of M. Mariotte. In effect, after conceiving the relative weight of a body, and its resistance equal to its absolute weight, as two contrary powers applied to the two arms of a lever, in the hypothesis of Galileo; there needs nothing to convert it into that of M. Mariotte, but to imagine that the resistance, or the absolute weight, is become less, every thing else remaining the same.

We have here only considered bodies as to be broke by their own weight. It will amount to the same, if we suppose them void of weight themselves, and to be broken by a weight applied to their extremities: only it is to be observed,

obſerved, that a foreign weight acts by an arm of a lever equal to the whole length of a body; whereas their own weight, being all united in the centre of gravity, or according to M. Mariotte, in the centre of percuſſion, is only the diſtance of that centre from the axis of equilibrium.

RESOLUTION, in phyſicks, the reduction of a body into its original, or natural ſtate, by a diſſolution or ſeparation of its aggregated parts.

Resolution, in chymiſtry. See Analysis.

Resolution, in logick, the inveſtigating or examining the truth or falſehood of a propoſition, by aſcending from ſome particular known truth, as a principle, by a chain of conſequences, to another more general one in queſtion.

Resolution, in mathematicks. See Analysis.

Resolution, in medicine, that coction or alteration of the crude peccant matter of any diſeaſe, either by the natural ſtrength of the patient, or by the application of remedies, whereby it is ſo far changed as to become laudable.

RESONANCE, in muſick, &c. a ſound returned by the air included in the bodies of ſtringed inſtruments, or even in the bodies of wind inſtruments, as flutes, &c.

RESPECTU *Computi Vicecomitis habendo*, a writ for the reſpiting the ſheriff's account, upon juſt occaſion, directed to the treaſurers and barons of the Exchequer.

RESPIRATION, *Reſpiratio*, the action of reſpiring, or breathing air. What reſpiration is, and why it is uninterruptedly carried on without the concurrence of the mind, will appear from what follows: though no action ſeems to be more frequent than reſpiration, yet it is not to be underſtood without conſiderable difficulty; not only becauſe it is partly vital, and partly voluntary, but alſo, becauſe an incredible number of organs are ſubſervient to it; for which reaſon its nature is carefully to be inveſtigated, which is moſt commodiouſly done, by conſidering the phænomena with which it is accompanied, and the organs employed in carrying it on. The lungs ſuſpended in the air, which every-where acts upon them, and equally preſſes them, always collapſe, contract themſelves into a ſmaller ſpace, and become much leſs than when they remained in the entire thorax, as is ſufficiently evinced by anatomy: this is principally performed by the contractile force of the muſcular fibres, which connect the ſquamous ſegments of the bronchia.

If the lungs, thus contracted, are filled with air, forcibly blown through the glottis, they are ſo diſtended, as, in bulk, not only to equal that which they had in the entire thorax, but even much to exceed it, as is ſufficiently certain from experience. The ſame thing happens, if when an acceſs for the air through the glottis is left to the lungs, the air externally acting on the lungs is either removed, or its preſſure diminiſhed. This may be demonſtrated from experiments made in the air-pump. Hence it is that the lungs, by their proper force, have always a tendency to become leſs in all their parts, than they are when placed in the entire thorax. For this reaſon it is certain, that they are in a continual ſtate of contraction, ſo long as a perſon is alive, ſo that they muſt collapſe and be diminiſhed, while the whole of the animal remains in a vacuum, obtained by an exhauſtion of the air in an air-pump. For there is nothing ſimilar to a circumambient air between the external membrane of the lungs, and all the internal ſurface of the pleura, in a ſound perſon; nothing, therefore, externally compreſſes the lungs, except the diaphragm. There is, however, always an internal air contained in them, and freely conveyed to them through the glottis. Hence the lungs are always ſomewhat more diſtended by the internal air, than they are compreſſed by the external air, the acceſs of which is hindered by the diaphragm, which is ſo connected with the ribs and vertebræ, that the air cannot enter the thorax in ſuch a manner as would be requiſite for an equilibrium. Since, therefore, in inſpiration, a greater quantity of air enters the lungs through the glottis, it will extend the lungs more, and overcome their natural force; ſo that in this action the lungs are paſſive; but how far they are active, is only to be diſcovered by certain phænomena.

In vital inſpiration then, eſpecially, conſidered in a ſleeping perſon, firſt the ribs, eſpecially the nine ſuperior ones articulated at the vertebræ, and by cartilages joined to the ſternum with their arched part, riſe ſo to the clavicles, that this motion is principally obſerved in the middle of the arch. Whilſt three, or, perhaps, four of the inferior ribs are turned downwards, backwards, and obliquely outwards; but in ſuch a manner, that the 7th, 8th, 9th, and 10th ribs are, by their cartilaginous ſegments, as it were, drawn inwards. Secondly, the whole abdomen, to the very end of inſpiration, is gradually rendered more tumid, and preſſed outwards. Thirdly, at the ſame time the cavity of the thorax is enlarged, as is obvious by meaſuring with a cord, by viewing it with the eye, and eſpecially by a mechanical conſideration of the figure, ſituation, connection, and articulation of the ribs here placed, according to the rules of perfect and moſt conſummate art, as Borelli has excellently demonſtrated. But, during this action, the diaphragm is drawn downwards from the convex and ſinuous ſituation it was in before, and aſſumes a plainer figure, as is obvious from diſſecting live animals, and from large abdominal wounds inflicted on men. But that this change of figure in the diaphragm depends upon the contraction of its muſcular fabrick, is ſufficiently obvious from an anatomical conſideration of it.

RESPITE, *Reſpectus*, in law, &c. a delay, forbearance, or prolongation of time, granted any one, for the payment of a debt, or the like.

RESPONDENT, in law, a perſon who undertakes to anſwer for another; or binds himſelf as ſecurity for the good behaviour of another.

RESPONDALIS, in law, he who appears for another in court, at a day aſſigned.

RESSAULT, in architecture, the effect of a body which either projects or falls back, i. e. ſtands either more out or in than another; ſo as to be out of the line, or range therewith.

RESSORT, a term uſed by late writers to ſignify the juriſdiction or authority of a court.

RESSOURCE, the means or foundation of a man's recovering himſelf from ruin; or an after-game for the repairing of his damages.

REST, in philoſophy, the continuance of a body in the ſame place; or its continual application or contiguity to the ſame parts of the ambient and contiguous bodies.

Rest, or *Pauſe*, in poetry, is uſed for the cæſura, which, in the Alexandrian verſes, falls on the ſixth ſyllable; and in verſes of 10 or 11 ſyllables, on the fourth.

Rest, in muſick, is a pauſe or interval of time, during which there is an intermiſſion of the voice or ſound.

RESTAURATION, or Restoration, the act of re-eſtabliſhing, or ſetting a thing in its former ſtate.

In England, we call the return of Charles II. after the civil wars, the Reſtauration, by way of eminence.

Restauration, in architecture, the repairing all the decayed parts of a building, in order not only to re-eſtabliſh it in its original form, but conſiderably augmented.

Restauration, in ſculpture, the repairing a mutilated ſtatue, &c.

RESTITUTION, in philoſophy, the returning of elaſtick bodies, forcibly bent, to their natural ſtate: by ſome called the motion of reſtitution.

Restitution, in a moral and legal ſenſe, implies a reſtoring a perſon to his right; or returning ſomething unjuſtly taken or detained from him.

Restitution *of Medals*, or Restituted *Medals*, is a phraſe uſed by antiquarians, for ſuch medals as are ſtruck by the emperors to renew or retrieve the memory of their predeceſſors.

RESTIVE, or Resty, a term applied to a horſe, &c. that ſtops and runs back, inſtead of going forwards.

RESTORATIVE, in medicine, a remedy proper for the reſtoring and retrieving the ſtrength and vigour.

RESTRICTION, the act of modifying, limiting, or reſtoring a thing to narrow bounds.

Restriction, in logick, is underſtood of the limiting a term, ſo as to make it ſignify leſs than it uſually does.

RESTRINGENT, in medicine. See Astringent.

RESULT, what is gathered from a conſequence, enquiry, meditation, &c. or the concluſion and effect thereof.

RESUMMONS, a ſecond ſummons, when the firſt is defeated, or ſuſpended by any accident.

RESUMPTION, in law, the taking again into the king's hands ſuch lands or tenements as before, upon falſe

falſe ſuggeſtion, or other error, he had delivered to the heir, or granted by letters patent.

RESUMPTION, in logick, the reduction of ſome figurative propoſition, to a more intelligent and ſignificant one.

RESURRECTION, the act of returning to a new or ſecond life, after having been dead.

The ancient philoſophers who believed the immortality of the ſoul, admitted alſo a reſurrection: whether they had received this opinion from the eaſtern people among whom they had travelled, or whether they inferred a reſurrection from the immortality of the ſoul, as a neceſſary conſequence, perſuading themſelves that a ſoul could not long continue, without being united to a body. But they explained this reſurrection in different manners. Pythagoras held a tranſmigration of ſouls, which was nearly the ſame with that of Plato: Thales and Democritus held alſo a kind of reſurrection; but the manner how they explained it is not known.

The belief of a reſurrection from the dead is an article of faith, taught both in the Old and New Teſtament, and embraced by the Jews and Chriſtians. At the time when our Saviour appeared in Judea, the reſurrection was received as one of the principal articles of the Jewiſh religion, by the whole body of the nation, the Sadduces only excepted. Some Jews believe that only the Iſraelites ſhall riſe, and that ſuch as have been wicked among them, ſhall have no part in this happy ſtate. Some among them maintain that men will be ſubject to die again after the reſurrection, and that their ſouls only will enjoy eternal happineſs. It is alſo a common opinion among them that all men, at leaſt all the Iſraelites, ſhall ariſe in the land of Canaan; and hence proceeds the ardent deſire they have always had of being buried in that country.

One of the greateſt arguments for the truth of Chriſtianity is drawn from the reſurrection of our Saviour; the circumſtances of which are handed down to us in ſo plain and diſtinct a manner by the Evangeliſts, as make the evidence of this important truth amount to a demonſtration:

Chriſtians generally believe, that at the day of judgment, the very identical body they have now, with the ſame fleſh, blood, and bones, will be raiſed from the dead. The two principal philoſophical objections againſt it are theſe.

1. That the ſame ſubſtance may happen to be a part of two or more bodies: thus a fiſh feeding on a man, and another man afterwards feeding on the fiſh, part of the body of the firſt man becomes incorporated with the fiſh, and afterwards with the body of the laſt man. Again, inſtances have been known of one man's immediately feeding on the body of another; and among the Cannibals in the W. Indies, who devour their enemies, the practice is frequent. Now it is alledged, where the ſubſtance of one is thus converted into the ſubſtance of another, each cannot ariſe with his whole body; to which then ſhall the common part be allotted?

To this objection ſome anſwer, that as all matter is not capable of being aſſimilated to the body, and incorporated with it, human fleſh may very probably be of this kind; and, therefore, what is thus eaten, may be again excreted and carried off.

But Mr. Leibnitz obſerves, that all that is eſſential to the body, is the original ſtamen, which exiſted in the ſemen of the father: this may be conceived as the moſt minute point imaginable, and therefore not to be ſeparated, nor any part of it united to the ſtamen of any other man. That all this bulk we ſee in the body, is only an accretion to this original ſtamen; and therefore there is no reciprocation of the proper matter of the human body.

Another objection is, that we know, by the late diſcoveries in the animal œconomy, that the human body is continually changing, and that a man has not entirely the ſame body to-day, as he had yeſterday; and it is even computed that in leſs than ſeven years time, the whole body undergoes a change. Which of thoſe many bodies then, which the ſame perſon has in the courſe of his life, is it that ſhall riſe? Or does all the matter that has ever belonged to him, riſe again? Or does only ſome particular ſyſtem thereof? The body, for example, he had at 20, at 40, or at 60 years old? If only this or that body ariſe, how ſhall it be rewarded or puniſhed for what was done by the other? And with what juſtice does one perſon ſuffer for another?

To this it has been anſwered on the principles of Leibnitz, that notwithſtanding theſe ſucceſſive changes, this ſtamen, which is the only eſſential part of the body, has always remained the ſame; and that on Mr. Locke's principles, perſonal identity, or the ſameneſs of a rational being, conſiſts in ſelf-conſciouſneſs, in the power of conſidering itſelf the ſame thing in different times and places. By this, every one is to himſelf what he calls ſelf; without conſidering whether that ſelf be continued in the ſame or ſeveral ſubſtances. It is the ſame ſelf now, it was then; and it was by the ſame ſelf which now reflects on an action, that action was performed. Now it is this perſonal identity that is the object of rewards and puniſhments, which, it is obſerved, may exiſt in different ſucceſſions of matter; ſo that to render the rewards and puniſhments juſt and pertinent, we need only to riſe again with ſuch a body as that we retain conſciouſneſs of our paſt actions.

RETAIL, in commerce, is the ſelling of goods in ſmall parcels, in oppoſition to wholeſale.

RETAINER, in law, a ſervant who does not continually dwell in the houſe of his maſter, but only attends upon ſpecial occaſions.

RETAINING FEE, the firſt fee given to a ſerjeant or counſellor at law, in order to make him ſure, and prevent his pleading on the contrary ſide.

RETARDATION, in phyſicks, the act of diminiſhing the velocity of a moving body. See MOTION.

RETE MIRABILE, in anatomy, a ſmall plexus, or net-work of veſſels in the brain, ſurrounding the pituitary gland. The rete mirabile is very conſpicuous in brutes, but either not exiſtent in man, or ſo very minute, that its exiſtence is fairly doubted.

RETENTION, *Retentio*, a faculty of the human mind, whereby, in order to a further progreſs in knowledge, it retains thoſe ſimple ideas which it before received by ſenſation or reflection.

RETENTION, in medicine, the ſtate of contraction in the ſolids or vaſcular parts of the body, which makes them hold faſt their proper contents.

RETENTION, is alſo uſed to ſignify the act of retaining the excrements, humours, &c. ſo that they cannot be voided out of the body.

RETIARII, in antiquity, a kind of gladiators, ſo called from *rete*, a net, which they make uſe of againſt their antagoniſts.

RETICULAR BODY, *Corpus reticulare*, in anatomy, a body of veſſels lying immediately under the cuticle or ſcarf-ſkin. Theſe veſſels contain a mucous liquor, from the tincture whereof Malphighi imagines the colour of the ſkin to be derived; founding his conjecture on this, that the cutis, as well as the cuticle of blacks, is white; and that they differ in no other circumſtance from thoſe of Europeans, but in this particular.

RETICULAR *Plexus*, in anatomy, a name ſometimes given to the choroides.

RETICULUM, in anatomy, the omentum or caul. See OMENTUM.

RETINA, in anatomy, one of the tunicks of the eye. See EYE.

RETINUE, the attendants or followers of a prince, or perſon of quality; chiefly upon a journey.

RETIRADE, in fortification, a kind of retrenchment made in the body of a baſtion, or other work, which is to be diſputed inch by inch, after the defences are diſmantled. It generally conſiſts of two faces, which make a re-entering angle.

RETORT, in chymiſtry, a kind of crooked matraſs, or a round-bellied veſſel, either of earth or glaſs, with a ſlender crooked beak, to which the recipient is to be placed.

RETRACTION, *Retractio*, the act of unſaying what a perſon had before ſaid or wrote.

RETRACTION, in anatomy, the contraction or ſhortening a part.

RETRACTS, in farriery, pricks in a horſe's feet, ariſing from nails that are ill-pointed, or driven amiſs.

RETRAXIT, in law, is where the plaintiff comes into court in perſon, and declares he will proceed no further in his action.

RETREAT,

RETREAT, in military affairs, the retiring, or moving back again of the army, or part of it. Xenophon's retreat of the 10,000 Greeks has been admired in all ages.

RETREAT, or RELAY, in mafonry, implies a fmall recefs, or diminution of the thicknefs of a wall, rampart, &c. in proportion as it is raifed.

RETRENCHMENT, in a literal fenfe, implies fomething cut off.

RETRENCHMENT, in architecture, is ufed not only to fignify what is cut off from a piece, when too large, &c. but alfo for the projectures taken out of ftreets, publick ways, &c. to render them more regular, and in a line.

RETRENCHMENT, in military affairs, implies any kind of work caft up to ftrengthen, or defend a poft againft the enemy. But it is more particularly ufed for a fimple retirade made on a horn-work or baftion, when it is intended to difpute the ground inch by inch.

RETRIBUTION, a gratuity or acknowledgment given in lieu of a former falary or hire, to perfons employed in affairs that do not fo immediately fall under eftimation, nor within the ordinary commerce of money.

RETROACTIVE, in law, that which has an influence or effect on time paft.

RETROGRADE, in aftronomy, an apparent motion in the planets; whereby they appear to an obferver placed on the earth, to move backward, or contrary to the order of the figns.

RETROGRESSION *of Curves*, their bending or turning backwards.

RETROMINGENTS, in natural hiftory, a clafs or divifion of animals, whofe characteriftick it is that they ftale, or make water backwards, both male and female.

REVEILLE, a beat of drum about break of day, to give notice that it is time for the foldiers to arife, and that the centries are to forbear challenging.

REVELATION, the act of revealing, or making a thing publick that was before unknown: it is alfo ufed for the difcoveries made by God to his prophets, and by them to the world; and more particularly for the books of the Old and New Teftament.

REVELATION *of St. John*, the fame with the Apocalypfe. See APOCALYPSE.

REVELS, entertainments of dancing, mafking, acting comedies, farces, &c. antiently very frequent in the inns of court, and in noblemen's houfes, but now much difufed. The officer who has the direction of the revels at court, is called the mafter of the revels.

REVENUE, the annual income a perfon receives from the rent of his lands, houfes, intereft of money in the ftocks, &c.

REVERBERATION, *Reverberatio*, in phyficks, the act of a body repelling or reflecting another after its impinging thereon. See REPULSION.

REVERBERATION, in chymiftry, denotes a kind of circulation of the flame by means of a reverberatory, or the return of the flame from the top of the furnace back to the bottom, chiefly ufed in calcination. Reverberation is of two kinds: the firft with a clofe fire, that is, a reverberatory furnace, where the flame has no vent at top, being covered with a dome or capital, which repels its acting back on the matter or the veffel that contains it, with increafed vehemence. After this manner is refining, the diftillation of acids, fpirits, &c. performed. Reverberation with an open fire, is that performed in a furnace or reverberatory, whofe regifters are all open, ufed in calcination, &c.

REVERIE, the fame with delirium, raving, or diftraction. It is ufed alfo for any ridiculous extravagant imagination, action, or propofition, a chimera or vifion. But the moft ordinary ufe of the word, among Englifh writers, is for a deep diforderly mufing or meditation.

REVERSION, *Reverfio*, in law, is defined to be returning of lands, &c. into the poffeffion of the donor, or his heirs. Reverfion, in the law of England, has two fignifications; the one of which is an eftate left, which continues during a particular eftate in being; and the other is the returning of the land, &c. after the particular eftate is ended; and it is further faid, to be an intereft in lands, when the poffeffion of it fails, or where the eftate, which was for a time parted with, returns to the grantors, or their heirs. But, according to the ufual definition of a reverfion, it is the refidue of an eftate left in the grantor, after a particular eftate granted away ceafes, continuing in the grantor of fuch an eftate. The difference between a remainder and a reverfion, confifts in this: that the remainder may belong to any man except the grantor; whereas the reverfion returns to him who conveyed the lands, &c.

REVIEW, in war, is the appearance of an army, or part of an army, in order of battle, and their being viewed by the general, that he may know the condition of the troops, fee that they are complete, and be a witnefs of the expertnefs with which they perform their evolutions, and other exercifes.

REVIEW, in Chancery. A bill of review is, where the caufe has been heard, and a decree therein figned and enrolled; but fome error in law appears in the body of the decree, or fome new matter is difcovered in time after the decree is made.

REVISE, among printers, a fecond proof of a fheet to be printed, taken off after correcting the firft.

REVIVIFICATION, in chymiftry, the act of reftoring a mixed body to its firft ftate, after it has been altered by fome chymical procefs.

REVIVOR, or REVIVER, in law. A bill of revivor, is where a bill has been exhibited in Chancery againft one who anfwers; but before the caufe is heard, or at leaft before the decree is inrolled, one of the parties dies. In this cafe a bill of revivor muft be brought, praying the former proceedings may ftand revived, and be put in the fame condition as at the time of abatement.

REVOCATION, in law, the act of revoking or annulling a power, grant, &c. before made.

REVOLUTION, in politicks, a grand turn or change of government.

The REVOLUTION, ufed by way of eminence, implies the grand change that happened in England in the year 1688, when James II. abdicated the crown.

REVOLUTION, in aftronomy, implies the motion of any heavenly body in its orbit, till it returns to the fame point where the motion began.

REVULSION, *Revulfio*, in medicine, the turning a flux of humours from one part of the body to another. It alfo fignifies the fpontaneous turn or reflux of humours in the body.

RHABOIDES, in anatomy, the fagittal future of the fkull.

RHABDOMANCY, an ancient method of divination performed by rods.

RHAGOIDES, in anatomy, the uvea, or fecond coat or tunick of the eye.

RHAPONTICUM, a medicinal root, refembling rhubarb.

RHAPSODISTS, *Rhapfodi*, in antiquity, perfons who made it their bufinefs to fing pieces of Homer's poems. Cuper informs us that, when the rhapfodi fung the Iliad, they were cloathed in red; and, when they fung the odyffee, in blue.

RHAPSODOMANCY, an ancient kind of divination performed by pitching on a paffage of a poet at random, and looking on it as a prediction of what was to happen.

RHAPSODY, in antiquity, a difcourfe in verfe, fung or rehearfed by a rhapfodift. Or, according to others, it fignifies a collection of verfes, efpecially thofe of Homer; which, having for a long time been difperfed in pieces and fragments, were at length, by Pififtratus's order, digefted into books called rhapfodies.

Hence, the moderns ufe the term for an affemblage of paffages, thoughts, &c. taken from divers authors, to compofe fome new piece.

RHETORICK, *Rhetorica*, the art of fpeaking copioufly on any fubject, with all the advantages of beauty and force.

RHEUM, a thin ferous watery matter, oufing through the glands, chiefly about the mouth.

RHEUMATISM, in medicine, a diftemper that happens moft commonly in fpring or autumn, when there is a remarkable change of air from hot to cold, and from cold to hot, when the wind fuddenly fhifts to any oppofite point. It begins, according to Sydenham, with a fhivering and other fymptoms of a fever, and in a day or two's time, or fometimes fooner, a vehement pain feizes one or more of the limbs, raging fometimes in one place and fometimes in another, efpecially in the arms, wrifts, fhoulders, and knees: very often there is a rednefs and

ſwelling, and the fever gradually goes off while the pain remains. This diſtemper often runs out into a great length, continuing ſometimes for ſome months or years, not perpetually with the ſame violence, but coming and going, and from time to time renewing its paroxyſms.

It chiefly attacks perſons in the flower of their age, after violent exerciſe, or a great heat of the body from any other cauſe, and then being too ſuddenly cooled. Its proximate cauſe Boerhaave takes to be an inflammation of the lymphatick arteries of the membranes near the ligaments of the joints, but not ſo violent as to bring on a ſuppuration. This diſeaſe is nearly a-kin to the gout and ſcurvy, and the blood is like that of thoſe afflicted with the pleuriſy. The pain is exaſperated upon the leaſt motion: it ſometimes attacks the loins and coxendix, and ſometimes the brain, lungs, and viſcera: when it ſeizes the loins it is then called lumbago; in this caſe, Sydenham obſerves that there is a moſt violent pain in the ſmall of the back, which ſometimes extends to the os ſacrum, and is like a fit of the gravel, only the patient does not vomit. If this diſeaſe is unſkilfully treated, it may continue ſeveral months or years, but not always with the ſame violence, but by fits. If it continues and increaſes, it may cauſe a ſtiff joint, which will ſcarce yield to any remedy.

Sydenham directs to take away ten ounces of blood on the ſide affected; this muſt be repeated three or four times, or oftener, once every other or every third day, according as the ſtrength of the patient will bear. The diet muſt be very thin, and an emulſion of the four cold ſeeds may be given; as alſo a pultice of white-bread and milk, tinged with a little ſaffron, may be laid to the part affected; a clyſter of milk and ſugar may be injected on thoſe days the bleeding is omitted. If the patient cannot bear frequent bleeding, after the ſecond or third time give the common purging portion every other day, and an ounce of diacodium at night, till he recovers.

In an incipient rheumatiſm of the ſhoulders, Hoffman ſays that nothing is better than a bliſter laid between the ſcapulæ; but if it happens to the plethorick, cupping, with ſcarification in the lower parts, repeated every month, does ſignal ſervice. The ſame phyſician thinks it may be proper to chew rhubarb, from two ſcruples to a dram, with raiſins or currants, two or three times a week.

The ſpirit of hartſhorn and the balſam of guaiacum, given in the quantity of 20 or 30 drops, three or four times a day, Dr. Shaw ſays, is of great ſervice: but he thinks nothing better than a decoction of the ſudorifick woods, to the quantity of a quart a day, for a month or ſix weeks together. This laſt, when aſſiſted with crude antimony and mercurius dulcis, Hoffman recommends in the venereal rheumatiſm, which often ariſes from the remains of a lues venerea contained in the maſs of blood. In a ſcorbutick rheumatiſm, or that ariſing from the ſcurvy, Sydenham directs the patient to take the ſcorbutick electuary and water, if he cannot bear any kind of evacuation.

He obſerves, that young perſons who live temperately may be cured by a ſimple refrigerating diet, and moderate nouriſhing, with as much certainty as by repeated bleeding: for inſtance, let the patient live four days upon whey alone; and after that white-bread may be allowed for dinner, and on the laſt day of his illneſs he may be allowed it for ſupper. When the ſymptoms ceaſe he may have boiled chickens, or any thing of eaſy digeſtion, but every third day he muſt live upon whey only, till his ſtrength returns. Boerhaave's method of cure is to the ſame effect, only he adviſes warm baths and ſtrong bliſters to be laid upon the part affected, nay even cauteries themſelves: but Hoffman obſerves that great caution ſhould be uſed with regard to topicks, for if the patient's conſtitution is ſanguineous they ſhould all be avoided, and the part covered carefully with the bed-cloaths: but if there is a thick, cold, ſtagnating humour in the part, and a ſenſe of cold, with a ſtricture of the pores, then frictions may be uſed with rough warm cloths, and afterwards cupping with ſcarifications. If the part becomes ſtiff and inflexible, with a numbneſs, which is called a pareſis, then take human or canine axungia, two ounces; balſam of Peru, and oil of cloves, each two drams; with which make a liniment for the part: this has been known to have a wonderful effect. Arbuthnot ſays that cream of tartar in water-gruel, taken for ſeveral days, will abate the pains and ſwellings conſiderably by its acidity, correcting the alkaline ſalts of the blood.

Cheyne ſays, that the hot and inflammatory rheumatiſms have all the ſymptoms of the gout, and like it, change from place to place, and by over violent evacuations may be tranſlated upon the noble organs.

REXIS, or REGMA, among oculiſts, ſignifies a rupture of the cornea of the eye.

RHINE-LAND-ROD, in fortification, &c. a meaſure of two fathoms, or 12 feet, uſed by the Dutch and German engineers.

RHODIUM, or ROSEWOOD, the wood or root of a tree, of which we have no certain account; brought from the Canary iſlands, in long crooked pieces, full of knots, externally of a whitiſh colour, internally of a deep yellow, with a rediſh caſt. The largeſt, ſmootheſt, ſtraighteſt, heavieſt, and deepeſt-coloured pieces ſhould be choſen; and the ſmall, thin, pale, light ones rejected.

This wood has a ſlightly bitteriſh, ſomewhat pungent, balſamick taſte, and a fragrant ſmell, eſpecially when ſcraped or rubbed, reſembling that of roſes. Digeſted in rectified ſpirit, it gives out pretty readily the whole of its active matter, and tinges the menſtruum of a rediſh yellow colour: on committing to diſtillation the filtered tincture, the ſpirit brings over little or nothing of its flavour; the fine ſmell, as well as the balſamick pungency, of the rhodium, remaining nearly entire in the inſpiſſated extract, which proves tenacious and adheſive like the turpentines. Infuſed in water, it gives out likewiſe great part of its ſmell and taſte, together with a bright yellow colour: in evaporation, the water carries off the ſpecifick flavour of the wood, leaving in the extract only a ſlight pungency and bitteriſhneſs. Diſtilled with water, it gives over, ſomewhat difficultly and ſlowly, a highly odoriferous eſſential oil, at firſt of a gold colour, by age turning rediſh; amounting, if the rhodium is of a good kind, to about one ounce from fifty: the diſtilled water is likewiſe agreeably impregnated with the fragrance of the rhodium, and greatly reſembles that of damaſk roſes.

The eſſential oil is uſed as a perfume, for ſcenting pomatums, &c. and in this light only the rhodium wood is generally regarded. It promiſes, however, to be applicable to more important purpoſes, and bids fair to prove a valuable cordial and corroborant.

Jamaica affords a wood called by the people there roſe-wood; which, though not the rhodium of the ſhops, has neverthelefs much of the ſmell: it is deſcribed by Sir Hans Sloane to be a tree growing to 20 or more feet in height, and thick enough to afford the largeſt ſegments we ever meet with of it; and poſſibly an adulteration of the true rhodium with this wood may be the true cauſe why the rhodium is not allowed to be the root, but a ſpecies of cytiſus, as Hoffman affirms.

The flowers of the Jamaica roſe-wood are ſmall and white, conſiſting of three petals, and ſtanding in cluſters: the fruit is a berry of the ſize of a pepper-corn, and the leaves of the tree are pinnated.

RHODON, in pharmacy, an appellation given to ſeveral compoſitions, on account of roſes being the chief ingredient in them; as the diarrhodon, rhodoſaccharum, &c.

RHOMBOIDES, in geometry, a quadrilateral figure whoſe oppoſite ſides and angles are equal, but is neither equilateral nor equiangular.

RHOMBOIDES, in anatomy, a thin, broad, and obliquely ſquare fleſhy muſcle, ſituated between the baſis of the ſcapula and the ſpina dorſi; ſo called from its figure. Its general uſe is to draw, backward and upward, the ſubſpinal portion of the baſis ſcapulæ.

RHOMBUS, in geometry, an oblique-angled parallelogram, or a quadrilateral figure whoſe ſides are equal and parallel, but the angles unequal, two of the oppoſite ones being obtuſe, and the other two acute.

RHOPHALICK VERSES, in ancient poetry, a kind of verſes, which beginning with monoſyllables, were continued in words growing gradually longer and longer to the laſt.

RHUBARB, *Rheum*, in botany, a plant whoſe flower is monopetalous, narrow at the baſe, and impervious, with the limb divided into ſix obtuſe ſegments, which are alternately ſmaller; the ſtamina are nine capillary filaments, inſerted in the corolla, and terminated with oblong, blunt, and twin antheræ: there is no pericarpium; the ſeed is ſingle, large, three-cornered, acute, and

and surrounded with membranaceous borders. The leaves are placed on long footstalks, which rise immediately from the root; they are heart shaped, smooth, ribbed on their underside, and waved on their edges; the stalk rises to the height of four feet; it is of a pale green, furnished with a small leaf at each joint, and the uppermost divided into branches supporting numerous panicles of flowers, which appear in June.

This plant is supposed to be the true Tartarian rhubarb, the root of which (so well known in medicine) is thick, of an oblong figure, large at the head, and tapering pretty suddenly as it extends in length; it is sometimes single, but more usually divided into two or three parts at the lower end. It is brought to us in unequal pieces, from four to five or six inches in length, and three or four thick; it is a little heavy, and of a dusky yellow without side, but within is marbled or variegated with yellow and red in the manner of a nutmeg; it is of a somewhat lax and spongy texture, of a sub-acid bitterish and somewhat astringent taste, with an agreeable aromatick smell.

Rhubarb is to be chosen fresh, tolerably hard, and moderately heavy, and such as does not dust the fingers in handling; such as, infused a few minutes in water, gives it a fine yellow, and when bruised in a mortar, has a redish colour with the yellow. Rhubarb is not so often adulterated as damaged; care is to be taken that it be not wet or rotten: much of it is subject, after steeping too long, to be worm-eaten and full of holes on the surface.

Rhubarb greatly strengthens the stomach and bowels, and is an excellent medicine against choler, and other distempered contents of the intestinal and mesenteriack glands: it is given, with great success, in all obstructions of the liver, in the jaundice, diarrhœa, fluor albus, and gonorrhœa; and the kidnies do not lie too remote from its influences, for it frequently passes so much that way, as to discover itself in the colour of the urine; it, therefore, is very good in obstructions of the reins and uterus; but in the jaundice, it almost passes for infallible: it is good against worms in children, and is the best purge that can be given them to clear away those crudities in the bowels, which are apt to breed them: it also gives a firmness to the fibres, which, from the slipperiness of children's diet, are generally too lax, so that its repetition to them can hardly be too frequent.

Rhubarb is given in powder, in infusion, and in its own crude solid state, the chewing it being, perhaps, the best way of giving it of all others. When it is intended to strengthen the stomach and assist digestion, the quantity of 25 grains, or thereabout, should be chewed daily on these occasions, an hour before eating: this is also the best way of taking it against obstructions of the viscera.

Its dose, in powder, is from half a scruple to two scruples; in infusion, about a dram of it will purge gently, but the dose may be increased to two drams: it is observable, that neither the infusion nor the decoction, nor even the extract of rhubarb, purge near so briskly as the root itself in powder.

The preparations of rhubarb in use in the shops are, 1. The tincture in spirit. 2. The tincture in wine: and, 3. The extract, though the last is but little used.

RHUMB, in navigation, a vertical circle of any place, or the intersection of such a circle with the horizon. Therefore, rhumbs coincide with the points of the world, or of the horizon; and hence navigators distinguish the rhumbs by the same name as the points and winds. See Compass.

Rhumb-Line, *Loxodromia*, in navigation, the line which a ship describes, keeping in the same collateral point or rhumb. See Course.

RHYAS, in medicine, a flux of the eye, occasioned by a diminution of the flesh in the greater canthus, or angle of the eye.

RHYME, in poetry, a similitude of sound between the last syllable or syllables of two verses. Rhymes may be distinguished into whole or perfect, and half or imperfect rhymes. The first is where there is a similitude of sound without any difference; the latter where there is a difference either in the pronunciation or orthography. The French distinguish their rhymes into masculine and feminine. The feminine is where the last syllable of the rhyme ends with an e mute; as in dove, belle, &c. The masculine rhymes are those of all other words.

RHYTHM, or Rhythmus, in musick, the variety in the movement as to the quickness or slowness, length or shortness of the notes. Or rhythmus may be defined, more generally, the proportion which the parts of a motion have to each other.

RIBBAND, or Ribbon, a narrow sort of silk principally worn by the ladies.

Ribbons of all sorts are prohibited to be imported.

Ribbands, in ship-building, certain thin narrow planks, which are so made, that they may be easily bent to the timbers. That which is nailed to the stern-post at the height of the rising line, and to the mid-ship-frame at the end of the rising of the floor-timbers, is called the floor ribband. That which answers to the wing-transom, and to the height of the lower deck on the mid-ship-frame, is called the breadth ribband: all the rest between these two are called intermediate ones.

These ribbands are nailed to all the frames from the stern-post to the stem, and when they are carried round, so as to make fair curves, the form of all the filling timbers may by them be determined.

RIBS, *Costæ*, in anatomy, long arched bones, serving to sustain the inner sides of the thorax.

The ribs are 24 in number, viz. 12 on each side the 12 vertebræ of the back; they are crooked, and like to the segments of a circle; they grow flat and broad, as they approach to the sternum; but the nearer they are to the vertebræ, the rounder and thicker they are; at which end they have a round head, which, being covered with a cartilage, is received into the sinus in the bodies of the vertebræ; and at the neck of each head, except the two last ribs, there is a small tubercle, which is also received into the sinus of the transverse processes of the same vertebræ. The ribs, thus articulated, make an acute angle with the lower vertebræ. The ribs have each a small canal or sinus, which runs along their under sides, in which lies a nerve, vein, and artery. Their extremities, which are fastened to the sternum, are cartilaginous, and the cartilages make an obtuse angle with the bony part of the ribs: this angle respects the head. The cartilages are harder in women than in men, that they may better bear the weight of their breasts. The ribs are of two sorts; the seven upper ones are called costæ veræ, because their cartilaginous ends are received into the sinus of the sternum: the five lower are called falsæ, because they are softer and shorter, of which only the first is joined to the extremity of the sternum, the cartilaginous extremities of the rest being tied to one another, and thereby leaving a greater space for the dilation of the stomach and entrails. The last of these false ribs is shorter than all the rest; it is not tied to them, but sometimes to the musculus obliquus descendens. If the ribs had been articulated with the bodies of the vertebræ at right angles, the cavity of the thorax could never have been enlarged in breathing. If each rib had been a rigid bone articulated to the transverse processes of the vertebræ, the sternum could not have been thrust out to that degree that it is now, or the cavity of the thorax could not have increased so much as is requisite in inspiration; for, when the ribs are pulled up by the intercostal muscle, the angles which the cartilages at the sternum make with the bony part of the rib must be increased, and consequently its substance, or the distance between the sternum and the transverse processes, lengthened. Now because the rib cannot move beyond the transverse process, upon the account of its articulation with it, therefore the sternum must be either thrust to the other side, or else outwards; it cannot move to the other side, because of an equal pressure upon the same account there; and therefore it is thrust outwards, or the distance between the sternum and vertebræ is increased. The last ribs which do not reach the sternum, and consequently produce nothing in this action, are not articulated with the transverse processes.

Ribs *of a Ship*, the timbers when the planks are taken off; so called, because they are bent like the ribs of a carcase or skeleton.

RICE, *Oryza*; this grain, which is so much in esteem in the eastern countries, that it is the principal corn they use, grows to be three or four feet high, with leaves broader than those of wheat, bearing spikes much divided, and composed of oblong flattish grains; having each a beard or awn, two or three inches long, forked at the top, and frequently coloured at bottom. They are

are of a white colour, compofed of a brown hufk or fkin. Rice is fown in Italy, Turkey, and the E. Indies; and we have as large and good from Carolina, as from any part of the world. It is chiefly ufed here for puddings, and to make rice-milk.

It is more ufed for food than phyfick, being a wholefome ftrengthening grain, reftringent and good for thofe who have a flipperinefs in their bowels, or are inclinable to a flux or loofenefs.

RICKETS, in medicine; the diforder, generally known by this name, is a kind of partial tabes, and confifts in an unequal nutrition, by which fome parts are deprived of their due nourifhment, and wafte away; which others, receiving more than enough, are preternaturally increafed with an incurvation of the bones and fpine of the back. When vifcid, tough, and pituitous humours, depofited in the fpinal marrow, are the caufe of the rickets, the firft intention of cure is to refolve the vifcidity of the juices, remove obftructions, and by that means promote a free circulation of the humours through all the body. For this purpofe, in order to remove the fountain of the diforder, lodged in the primæ viæ, we are, above all things, to ufe gentle laxatives; not neglecting, if it is neceffary, and the conftitution of the child admits, the ufe of mild emeticks, confifting of a few grains of the root of ipecacuanha, exhibited with fugar and cinnamon water, prepared without wine, or reduced to the form of an electuary, with fome proper fyrup; for, by thefe means, the vifcid fordes, collected in the ftomach and inteftines, are not only excellently eliminated, but alfo, by the ftimulus of fuch medicines, a due refolution of the humours, and an opening of the obftructed veffels, are fuccefsfully obtained; only fuch ftimulating medicines are not to be exhibited to patients whofe ftrength is exhaufted, who labour under any diforder of the mefentery, or a violent obftruction of the vifcera, fince in fuch cafes it is more expedient to exhibit medicines of the deobftruent kind.

To the medicines already recommended, we may alfo now and then add thofe of a gently refolvent kind, as diaphoreticks generally are, fuch as the tincture of tartar, the acrid tincture of antimony, and preparations of cinnabar; which, in the rickets, are preferable to mercurials, and highly beneficial in eliminating the ferous impurities, partly by perfpiration, and partly by urine efpecially if they are exhibited in fuch infufions as dilute and purify the blood.

But in particular for removing the obftructions of the fpinal marrow, and reftoring the influx of the nervous fluid into it, various authors recommend frictions of the fpine of the back, arms, and legs, with warm linen cloths; as alfo fumigations of frankincenfe, amber, maftich, and olibanum. But we can, from experience, recommend, as the moft effectual remedy, baths of fweet water, boiled with nervous herbs, fuch as marjoram, lavender, mother of thyme, rofemary, camomile, and baum. In fuch baths the patient is to be frequently immerfed, and have the fpine of the back and joints rubbed and anointed with the following nervous ointment.

Take of human fat, and expreffed oil of nutmegs, each half an ounce, of Peruvian balfam one drachm, and of the oils of rue, lavender, and cloves, each 30 drops. By thefe means we have often feen many patients, afflicted with the rickets, not only furprifingly relieved, but alfo totally recovered.

RIDEAU, in fortification, is a fmall elevation of earth, extending lengthwife on a plane, and ferving to cover a camp, or to give an advantage to a poft. Rideaus are alfo convenient for thofe who would befiege a place, and ferve to fecure the workmen in their approaches to the foot of a fortrefs. Rideau is alfo ufed fometimes for a trench, the earth of which is thrown upon its fides, to ferve as a parapet for covering the men.

RIDER, a term ufed for an after-claufe added to a bill while depending in parliament.

RIDERS, in a fhip, are large timbers, both in the hold and aloft, bolted on to other timbers to ftrengthen them, when the fhip is difcovered to be too flightly built.

RIDGE, in agriculture a long piece of rifing land, between two furrows.

The method of plowing land up into ridges is a particular fort of tillage. The chief ufe of it confifts in the alteration it makes in the degrees of heat and moifture; thefe being two of the grand requifites of vegetation, and very different degrees of them being requifite to the different forts of plants. Thofe plants commonly fown in our fields require a moderate degree of both, not being able to live upon the fides of perpendicular walls in hot countries, nor under the water in cold ones, neither are they amphibious; but they muft have a furface of earth, not covered, nor much foaked with water, which deprives them of a proper degree of heat, and caufes them to languifh. In this cafe they look weak, and their leaves yellowifh. They ceafe growing, and, in fine, die in a very weak and bad ftate. The only way to cure the land of giving this difeafe to plants, is to lay it up in ridges, that the water may fall off, and run into the furrows below, from whence it may be conveyed by drains and ditches into fome river, or otherways carried wholly off from the land.

RIDGE, in building, the higheft part of the roof or covering of a houfe.

RIDGES *of a Horfe's Mouth*, are wrinkles or rifings of flefh in the roof of the mouth, running acrofs from one fide of the jaw to the other with furrows between them.

RIGADOON, a gay and brifk dance, borrowed originally from Provence in France, and performed in figure, by a man and a woman.

RIGGING, amongft feamen, a term which comprehends all the ropes, either to fecure the mafts, or manage the fails and yards.

RIGGING-OUT, thrufting out any boom to extend the foot of a fail, as the jib-boom, which is run out from the bowfprit; the driver-boom, which projects over the fhip's fide; and the ftudding-fail-booms, which are thruft out from the feveral yard arms.

RIGHT, in geometry, fignifies the fame with ftraight: thus, a ftraight line is called a right one. As for right angle, right afcenfion, right cone, right defcenfion, right fphere, &c. they are explained under the articles ANGLE, ASCENSION, &c.

RIGHTING *of a Ship*, amongft feamen, the act of raifing or erecting her after fhe had inclined to one fide, on a careen or otherwife.

RIGHTING *the Helm*, placing it amid-fhips, fo as to make the fhip continue in the courfe to which her ftem is directed by the former impulfe of the helm.

RIGIDITY, in philofophy, a brittle hardnefs; or that fpecies of hardnefs fuppofed to arife from the mutual indentation of the component particles within one another.

RIGOR, in medicine, a convulfive fhuddering, from fevere cold, an ague fit, or other diforder.

RIM, in a watch, or clock, the edge or border of the circumference or circular part of a wheel.

RIND, the fkin of any fruit that may be cut off or pared. The outer coat of the chefnut, fet with prickles, is particularly termed the urchin-like rind. Rind is alfo ufed for the inner bark of trees, or that whitifh foft fubftance which adheres immediately to the wood.

In the modern theory of vegetation, the fap is fuppofed to pafs through the rind, in its return from the extremities of the branches to the root. Others fuppofe its veffels to do the office of arteries, whence Mr. Bradley calls them arterial veffels.

RING, an ornament of gold, filver, &c. made of a circular form, and generally worn on the finger.

RING-BONE, in farriery, a hard callous fubftance, growing in the paftern of a horfe, above the coronet: it is thus called from its growing quite round like a ring.

RING-DIAL. See DIAL.

RING-WORM, in medicine, the fame with the ferpigo. See SERPIGO.

Fairy-RING, or circle. See FAIRY.

Saturn's-RING, in aftronomy. See SATURN.

RIOT, in law, is where three or more perfons, affembled together, commit fome unlawful act with force and violence, to the difturbance of the peace; as beating fome perfon, forcibly entering upon the poffeffion of the lands, houfes, &c. of another, or breaking down inclofures, houfes, &c.

RIPENERS, in furgery, medicines that promote fuppuration, otherwife called fuppuratives. See the article SUPPURATIVES.

RISING, *Ortus*, in aftronomy, the appearance of the fun, a ftar, &c. above the horizon of any place.

There are three kinds of poetical rising of the ſtars, viz. acronycal, coſmical, and heliacal. See ACRONYCAL, &c. The heavenly bodies always appear above the horizon before they really arrive at it, on account of refraction. See REFRACTION.

RITE, *Ritus*, among divines, denotes the particular manner of celebrating divine ſervice in this or that country *. See RITUAL.

RITORNELLO, or REPEAT, in muſick, the burden of a ſong, or the repetition of the firſt or other verſes of a ſong at the end of each ſtanza or couplet.

RITUAL, a book directing the order and manner to be obſerved in celebrating religious ceremonies, and performing divine ſervice in a particular church, dioceſe, order, or the like.

RIVER, *Fluvius*, or *Flumen*, a current or ſtream of freſh water flowing in a bed or channel from its ſource into the ſea.

The great as well as the middle-ſized rivers proceed either from a confluence of brooks and rivulets, or from lakes; but no river of conſiderable magnitude flows from one ſpring, or one lake, but is augmented by the acceſſion of others. Thus the Wolga receives above 200 rivers and brooks before it diſcharges itſelf into the Caſpian Sea; and the Danube receives no leſs, before it enters the Euxine Sea.

Motion of RIVERS. The running of rivers is upon the ſame principle as the deſcent of bodies on inclined planes; for water no more than a ſolid can move on an horizontal plane, the re-action of ſuch a plane being equal and contrary to gravity, entirely deſtroys it, and leaves the body at reſt: here we ſpeak of a plane of ſmall extent, and ſuch as coincides with the curved ſurface of the earth. But if we conſider a large extent or long courſe of water, then we ſhall find that ſuch water can never be at reſt, but when the bottom of a channel coincides every where with the curved ſurface of the earth.

RIVULET, a diminutive of river. See RIVER.

ROACH, in ichthyology, a ſpecies of cyprinus, with the iris and belly-fins uſually red; it is generally, when full grown, nine inches long, but it ſometimes grows conſiderably larger.

ROACHING *of Alum*, is the laſt proceſs in making alum, which being ſufficiently waſhed in a ciſtern of ſtrong alum-water, is put into large pans, and a quantity of water added to it; and then being ſet over the fire to melt, and boil a little, it is ſcooped into a great caſk, where it is ſuffered to ſtand and chryſtallize, and is what they call roach, roached, or rock alum. See the article ALUM.

ROAD, an open way, or publick paſſage, forming a communication between one place and another.

ROASTING, in metallurgy, the ſeparation of volatile bodies from thoſe which are more fixed, by the combined action of air and fire; and is generally the firſt proceſs in the ſeparation of metals from their ores: it differs from ſublimation only in this, that in this operation the volatile parts are diſſipated, when reſolved into vapours; whereas in that, they are preſerved.

ROB, in pharmacy, a preparation much uſed by the ancients, conſiſting of the juices of fruits, purified and boiled to a conſumption of two-thirds of their moiſture.

ROBBERY, in law, a feloniouſly taking away another man's goods from his perſon, or eſtate, againſt his will, putting him in fear, &c.

ROBERVALLIAN LINES, a name given to certain lines uſed for the transformation of figures; ſo called from their inventor, M. de Roberval.

ROBORANTIA, in medicine, ſtrengtheners, or ſuch medicines as ſtrengthen the parts, and give new vigour to the conſtitution.

ROCAMBOLES, in cookery, a mild ſort of garlick, by ſome called Spaniſh garlick.

ROCK CRYSTAL, is that ſuppoſed to be formed by a completion of the lapidifick juice which trickles down in rocks and caverns.

ROCKET, in pyrotechny, an artificial fire-work, conſiſting of a cylindrical caſe of paper, filled with a compoſition of certain combuſtible ingredients; which, being tied to a ſtick, mounts into the air to a conſiderable height, and there burſts.

ROD, in ſurveying, a meaſure of land, equal to 16 feet and a half, the ſame with pole or perch.

ROE, of a fiſh, that part which contains the ſperm or ſeed. The male fiſhes are uſually diſtinguiſhed by the name of ſoft roe, or milt; that of the female by hard roe or ſpawn.

ROGA, in antiquity, a donative or preſent, which the auguſti or emperors made to the ſenators, magiſtrates, and even the people; and the popes, or patriarchs, to their clergy.

ROGATION *Week*, the week immediately preceding Whit-ſunday; ſo called from three faſts therein, viz. on the Monday, Tueſday, Wedneſday, called Rogations, or Rogation-days, becauſe of the extraordinary prayers and proceſſions then made for the fruits of the earth.

ROLL, *Rotulus*, in law, a ſchedule of paper, or parchment, which may be wound up by the hand into the faſhion of a pipe.

ROLLS *of Parchment*, the manuſcript regiſters of the proceedings of our ancient parliaments.

Rider ROLL, a ſchedule, or ſmall piece of parchment, frequently ſewed, or added, to ſome part of a roll, or record.

Court ROLL of a manor, that wherein the names, rents, and ſervices of each tenant are copied and enrolled.

Muſter-ROLL, that wherein are entered the ſoldiers of every troop, company, regiment, &c.

ROLLS, *or Office of* ROLLS, an office in Chancery-Lane, London, appointed for the cuſtody of the rolls and records in Chancery.

ROLLS *of Parliament*, are the manuſcript regiſters, or rolls of the proceedings of our ancient parliaments, which before the invention of printing were all engroſſed on parchment, and proclaimed openly in every county. In theſe rolls are alſo contained a great many deciſions of difficult points of law, which were frequently in former times referred to the deciſion of that high court.

ROLL, or ROLLS, is alſo a piece of wood, iron, braſs, &c. of a cylindrical form, uſed in the conſtruction of ſeveral machines, and in ſeveral works and manufactures.

ROLLING-PRESS. See PRINTING.

ROMAN, in general, ſomething belonging to the city of Rome.

King of the ROMANS, in modern hiſtory, is a prince elected to be ſucceſſor to the reigning emperor of Germany.

ROMANCE, in matters of literature, a fabulous relation of certain adventures deſigned for the entertainment and inſtruction of the readers.

ROMPEE, or ROMPU, in heraldry, is applied to ordinaries that are repreſented as broken, and to chevrons, bends, or the like, whoſe upper points are cut off.

RONDEL, in fortification, a round tower ſometimes erected at the foot of a baſtion.

ROOD, a quantity of land equal to 40 ſquare perches, or the fourth part of an acre.

ROOF, in architecture, the uppermoſt part of a building. The roof contains the timber-work, and its covering of ſlate, tile, lead, &c. though carpenters uſually reſtrain the word to the timber-work only. The form of roofs is various: ſometimes it is pointed, in which caſe the moſt beautiful proportion is to have its profile an equilateral triangle: ſometimes it is ſquare, that is, the pitch or angle of the ridge is a right angle, which therefore is a mean proportion, between the pointed and flat roof, which laſt is in the ſame proportion as a triangular pediment: this is chiefly uſed in Italy, and the hot countries where there is but little ſnow. Sometimes roofs are made in the pinnacle-form: ſometimes they have a double ridge, and ſometimes they are mutilated, that is, conſiſt of a true and a falſe roof, which is laid over the former: ſometimes again they are in the form of a platform, as moſt of the eaſtern buildings are; and ſometimes they are truncated, that is, inſtead of terminating in a ridge, the roof is cut ſquare off at a certain height, covered with a terrace, and in compaſſed with a balluſtrade; and ſometimes, again, a roof is made in the manner of a dome. When the walls have been raiſed to their deſigned

* An univerſal hiſtory of Religious Rites, Ceremonies, and Cuſtoms of the whole World: or a complete and impartial View of all the Religions in the various Nations of the Univerſe, both ancient and modern, from the Creation down to the preſent Time; is now publiſhing, in weekly numbers; an elegant copper-plate with each number, and the whole to be completed in 60 numbers, by *Alex. Hogg*, No. 16, *Pater noſter-Row*.

height, the vaults made, the joists laid, the stairs, &c. brought up, then the roof is to be raised, which embracing every part of the building, and with its weight equally pressing upon the walls, is a band to all the work; and besides defends the inhabitants from rain or snow, the burning heat of the sun, and the moisture of the night, and is of no small advantage to the building, in casting off the rain water from the walls.

Roof-Trees, or Ruff-Trees, in a ship, are small timbers which go from the half-deck to the fore-castle, and serve to beat up the gratings. This term is also used for the upper timbers in any building.

ROOT, *Radix*, among botanists, denotes the lower part of a plant, whereby it adheres to the earth, naturally drawing its nourishment and transmitting the juices to the other parts. The roots of plants are distinguished according to their various structures, as perpendicular, horizontal, ramose, tuberose, bulbous, &c.

Root, in mathematicks, implies a quantity considered as the basis or foundation of a higher power; or one which being multiplied into itself any number of times, produces a square, cubick, biquadratick, &c. quantity; called the second, third, fourth, &c. power of the root, or quantity, so multiplied into itself. Thus a is the square root of $a \times a$, or a^2; and 4 the square root of $4 \times 4 = 16$. Again, a is the cube-root of $a \times a \times a = a^3$; and 3 the cube-root of $3 \times 3 \times 3 = 27$: and so on. See Extraction.

Roots, *Radices*, in grammar, are the primitive words of a language, whence the others are formed or derived.

ROPE, hemp, hair, &c. spun out into a thick yarn, and then several strings of this yarn twisted together by means of a wheel. When made very small, it is called a cord, and when very thick, a cable.

Rope, a general name given to all the different kinds of rope in a ship.

Rope-Bands, a small cord, in length about three or four times the circumference of the yard. They are inserted through eye-lid holes for the whole length of the upper edge of the square sails, and are used to fasten the head of the sail to the yard.

Rope-Yarn, a thread or twisted line of hemp, which is the first and simplest part of a rope. A number of these are twisted together to form a strand, in proportion to the size of the rope, whereof the strand makes a part. Three strands are then twisted into one another, which completes the process of ordinary rope-making. But cables, hausers, and other ground-tackling, are composed of three strands, each of which is formed by three less ones.

ROSACEOUS, among botanists, an appellation given to such flowers as are composed of several petals or leaves, disposed in a sort of circular form, like those of the rose: such are the flowers of the piony, crowfoot, cinquefoil, &c. See Botany.

ROSARY, among the Roman Catholicks, the same with chaplet.

ROSE, *Rosa*, in botany, a genus of plants, the flower of which is composed of five petals, obversely cordated, and arranged in a circular form: the fruit is formed of the fleshy base of the cup, which is of a turbinated figure, coloured, soft, containing only one cell drawn together at the neck, and coronated with some irregular laciniæ; the seeds are numerous, oblong, and hairy.

The wild briar, with beautiful pinnated leaves, a white or pale red flower, and the common hip for its fruit, is that above described: and, indeed, all the beautiful roses in our gardens, are only varieties of this species, principally owing to culture; the red, the damask, the white, the variegated, &c. roses, being all produced from this original species.

The flowers of the red rose are astringent, those of the damask-rose purgative, and the fruit of the wild-rose pectoral. The rose-water of the shops, distilled from the flowers of the damask-rose, has been celebrated for many virtues; but its fragrant smell is the only quality now regarded in it. There is also a syrup, made either from the juice, or infusion of the fresh flowers of damask-roses.

Rose-Root, *Rhodium*. See Rhodium.

Rose, in architecture, an ornament cut in the form of a rose, chiefly used in corniches, frizes, vaults of churches, &c. and particularly in the middle of each face in the Corinthian abacus.

Rose-noble, an English gold coin, first struck in the reign of Edward III. It was formerly current at 6s. 8d. and so called because stamped with a rose.

ROSEMARY, *Rosemarinus*, in botany, a medicinal plant, that grows wild in many parts of Spain, France, and Italy, and is cultivated in our gardens; it is propagated by cuttings or slips taken off in the spring of the year, and planted in a bed of light fresh earth, and in the following autumn they may be transplanted where they are intended to remain.

Rosemary has at all times been a favourite shrub in medicine; it is full of volatile parts, as appears by its taste, smell, and analysis. It is a very valuable cephalick, and is good in all disorders of the nerves, and in hysterick and hypochondriack cases. It is good in palsies, apoplexies, epilepsies, and vertigoes. It strengthens the sight, and sweetens the breath. It is greatly commended by some against obstructions of the viscera, particularly of the liver and spleen, and in the jaundice. The flowers have the credit of being great cordials, and some imagine they even possess the virtues of the whole plant in a more exalted degree than any other part. The flowery tops, leaves, and husks, together with the flowers themselves, are much fitter for all purposes than the flowers alone. Rosemary, distilled simply, yields a fragrant water called dew of rosemary; distilled with water in an alembick, it affords a water tasting strongly of it, but of a less agreeable smell; with rectified spirit it makes the fragrant and cephalick liquor called Hungary water. A conserve is also made of the flowers very proper for reducing the ingredients of cephalick electuaries into form, and it is an ingredient in many of the compositions of the shops.

ROSOLIS, or Ros-solis, *Sun-dew*, an agreeable spirituous liquor, composed of burnt brandy, sugar, cinnamon, and milk-water, and sometimes perfumed with a little musk.

ROSTRA, in antiquity, a part of the Roman forum, wherein orations, pleadings, funeral harangues, &c. were delivered.

ROSTRUM, literally denotes the beak or bill of a bird; and hence it had been figuratively applied to the beak, or head of a ship.

Rostrum, in chymistry, implies the nose or beak of the common alembick, which conveys the liquor distilled into its receiver.

ROSYCRUCIANS, Rosicrusians, or *Brothers of the Holy Cross*, a name assumed by a sect or cabal of hermetical philosophers, who appeared, or at least were first taken notice of in Germany, in the beginning of the last century. Their chief was a German gentleman, educated in a monastery, where he learnt the languages. In 1378, he went to the Holy Land, where falling sick at Damascus, he consulted the Arabs, and other eastern philosophers, by whom he was supposed to be initiated into this wonderful art. At his return into Germany, he formed a society, to whom he communicated the secrets he had brought with him out of the East, and died in 1484. They have been distinguished by several names, accommodated to the several branches of their doctrine. Because they pretended to protract the period of human life by means of certain nostrums, and even to restore youth, they were called immortales. As they pretended to know all things, they have been called illuminati; and because they have made no appearance for several years, but have kept altogether incognito, they have been called the invisible brothers. Their society is frequently signified by the letters F. R. C. which some of them interpret fratres rori cocti, it being pretended that the matter of the philpsopher's stone is dew concocted, exalted, &c. They bound themselves together by a solemn secret, which they swore inviolably to preserve; and obliged themselves, at their admission into the order, to a strict observance of certain established rules. They pretended to know all sciences, and chiefly medicine; whereof they published themselves the restorers. They pretended to be masters of abundance of important secrets; and, among others, that of the philosopher's stone; all which they affirmed to have received by tradition from the ancient Egyptians, Chaldeans, the Magi, and Gymnosophists.

ROT, a disease incident to sheep in moist years, arising from a certain principle of putrefaction, both in the air and the grass. It is a very hard thing to prevent the rot, if the year proves very wet, especially in May and June. Salt marshes, and lands where broom grows, are the best places of preservation for them. Sheep are sometimes all cleared of the rot, when not too far gone with it, only by removing them into broom-fields. Scurvy-grass, mustard, parsley, and thyme, are also good for the prevention of it. Some propose the giving sheep half a handful of bay-salt every month, or oftener; and there is great probability that this may be of service; but the rational way of attacking all disorders in cattle, is by considering what are the causes of them. It will appear, upon enquiry, that wet seasons are the general occasions of the rot in sheep, and therefore it would be adviseable for the owners, when such seasons come on, to remove those animals into the driest pastures they can, and then to feed them principally with dry sweet hay, oats, bran, and the like; this would prevent the occasion: and if they were already a little infected, some salt given with their dry food, would be a happy means of curing them.

ROTA, in mechanicks. See WHEEL.

ROTA *Aristotelica*, Aristotle's wheel, is the name of a celebrated problem in mechanicks, founded on the motion of a wheel about its axis; thus called, because first, as we know of, taken notice of by Aristotle.

The difficulty is this: while a circle makes a revolution on its centre, advancing at the same time in a right line along a plane, it describes on that plane a right line equal to its circumference. Now, if this circle which we may call the deferent, carry with it another smaller circle concentrick with it, and which has no motion but what it receives from the deferent, which is the case of the nave of a coach-wheel carried along by the wheel; this little circle or nave will describe a line in the time of the revolution, equal, not to its own circumference, but to that of the wheel: for that its centre advances in a right line, as fast as that of the wheel does, as being in reality the same therewith. The matter of fact is certain, but how it should be, seems mysterious. It is obvious that the wheel, advancing during the revolution, must describe a right line equal to its circumference, but how could the nave which revolves like the wheel describe a right line so much greater than its circumference?

The solution Aristotle gives is no more than a good explication of the difficulty. Galileo, who next attempted it, has recourse to an infinity of infinitely little vacuities in the right line described by the two circles, and imagines that the little circle never applies its circumference to those vacuities, but, in reality, only applies it to a line equal to its own circumference, though it appears to have applied it to a much larger. But it is evident that this is all gratis dictum. The vacuities are imaginary, and why does not the great circle apply its circumference to them? Lastly, the magnitude of their vacuities must be augmented or diminished according to the different proportion of the two circles.

F. Tacquet will have it, that the little circle, making its rotation more slowly than the great one, does on that account describe a line longer than its circumference to more than one point of its base. But this is no more allowable than the former.

Many great men having attempted in vain to account for this phænomenon, Mr. de Meyran, a French gentleman, had the good fortune to light on a solution of it, which the academy of sciences declared to be satisfactory. It is this: a wheel is only acted on, or drawn forward, in a right line: its circular motion, or rotation, arising purely from the resistance of the ground whereon it is applied. Now this resistance is equal to the force wherewith the wheel is drawn in the right line, inasmuch as it defeats that direction, and, consequently, the causes of the two motions being equal, their effects are equaltoo; or, a point in the wheel describes, during one revolution, a right line on the ground equal to its outer circumference.

But as to the nave of the wheel, the case is otherwise; for though it is drawn in a right line by the same force as the outer circumference, yet it only turns round because the wheel turns, and can only turn with it, and in the same time. Hence it follows, that its circular velocity is less than that of the circumference of the wheel, in the ratio of the two circumferences; and therefore of course, its circular motion is less than its rectilinear one. Since then it necessarily describes a right line equal to that described by the circumference of the wheel, it can only do it by sliding along.

ROTA is also the name of an ecclesiastical court at Rome, composed of 12 prelates, whereof one must be a German, another a Frenchman, and two Spaniards; the other eight are Italians, three of whom must be Romans, and the other five, a Bolognese, a Ferraran, a Milanese, a Venetian, and a Tuscan. This is one of the most august tribunals in Rome, which takes cognizances of all suits in the territory of the church, by appeal; as also of all matters beneficiary and patrimonial.

ROTATED FLOWERS, among botanists, are such flowers which spread open so as to form the shape of a wheel.

ROTATION, in geometry, a term chiefly applied to the circumvolution of any surface round a fixed and immoveable line, which is called the axis of its rotation: and by such rotations it is, that solids are conceived to be generated.

ROTATOR, in anatomy, a name given to the oblique muscles of the eye; called also ciliares, from the direction of their fibres.

ROTONDO, *Rotundo*, in architecture, a popular term for any building that is round both within and without side, whether it be a church, a saloon, a vestible, or the like.

ROTUNDUS, in anatomy, a name given to several muscles of the body, from their roundness. See MUSCLE.

ROUND, in military affairs, implies a walk or turn which an officer, attended with some soldiers, takes in a garrison or fortified place, around the ramparts in the night time; to listen if any thing be stirring without the works, and to see that the centinels are watchful and do their duty, and all things in good order.

When the round is near the corps de garde, the centry calls aloud, Who comes there? and when the answer is, The rounds, he says, Stand; then calls for the corporal of the guard, who draws his sword, and calls also, Who comes there? and when it is answered, The rounds, he that has the word advances, and delivers it to the corporal, who receives it with his sword pointed to the giver's breast.

ROUND-HOUSE, in a ship, the uppermost cabbin on the stern of the ship.

ROUND-*House*, also implies a kind of prison, for the nightly watch to secure persons in, till they can be carried before a magistrate.

ROUT, a publick road, highway, or course; especially that which military forces take.

ROUT, also implies the defeat and flight of an army.

ROUT, in law, an assembly or combination of three or more persons, going to commit an unlawful act, though they do not actually perform it. If they go, ride, or move forwards, after their meeting, it is a rout, though they do not execute their purpose; if they do, it is a riot.

ROWEL, in farriery, a kind of issue, made by drawing a skein of silk, thread, hair, or the like, through the nape of the neck, or other part of a horse; answering to what in surgery is called a seton.

ROYAL, *Regal*, something relating to a king.

ROYAL *Academy of Sciences*. See ACADEMY.

ROYAL *Antler*, among hunters, the third branch of the horn of a hart or buck, which shoots out from the rear of the main horn above the back-antler.

ROYAL *Army*, an army marching with heavy cannon, capable of besieging a strong, well fortified place.

ROYAL *Assent*, that approbation or assent which the king gives to a thing done by others; as the election of a bishop, or a bill passed in both houses of parliament. The royal assent in parliament being given, the bill is indorsed with, Le roy le veult, it pleaseth the king. If he refuses it, Le roy s'avisera, the king will advise upon it.

ROYAL *Parapet*, in fortification, a bank about three fathoms broad, and six feet high, placed upon the brink of the rampart, towards the country. Its use is to cover those who defend the rampart.

ROYAL *Society*, of England, is an academy or body of persons of eminent learning, instituted by king Charles II. for the promoting of natural knowledge. This illustrious body had its original in an assembly of ingenious men, who before the restoration met weekly in Wadham-college, at the lodgings of Dr. Wilkins.

Afterwards, from about the year 1658, many of them, living in London, held meetings at Gresham-college, till they were at length taken notice of by the king, who was pleased to grant them an ample charter, dated April 22, 1663; whereby they were erected into a corporation, consisting of a president, council, and fellows, for promoting the knowledge of natural things and useful experiments. Their manner of electing fellows is by balloting. Their council are in number 21, 11 of which are continued for the next year, and 10 more added to them, all chosen on St. Andrew's day. Each member, at his admission, subscribes an engagement that he will endeavour to promote the good of the society; from which he may be freed at any time, by signifying to the president, that he desires to withdraw. The charges are 40s. paid to the treasurer at admission, and 13s. per quarter, so long as he continues a member. Their design is to make faithful records of all the works of nature or art which comes within their reach; so that the present, as well as after ages, may be enabled to put a mark on errors which have been strengthened by long prescription, to restore truths that may have been neglected, to push those already known to more various uses to make the way more passable to what remains unrevealed, &c. To this purpose they have made a great many experiments and observations on most of the works of nature, eclipses, comets, meteors, mines, plants, earthquakes, inundations, springs, damps, subterraneous fires, tides, currents, the magnet, &c. Also numbers of short histories of nature, arts, manufactures, useful engines, contrivances, &c. The services they have been of to the publick are very great. They have improved naval, civil, and military architecture; advanced the security and perfection of navigation, improved agriculture, and put not only this kingdom, but also Ireland, the plantations, &c. upon planting. They have registered experiments, histories, relations, observations, &c. reduced them into one common stock, and have from time to time published some of the most immediate use under the title of Philosophical Transactions, &c. and laid the rest up in publick registers to be transmitted to posterity as a solid ground-work for future systems. They have a library adapted to their institution, to which the late Earl Marshal contributed the Norfolcian library, and a musæum, or repository of natural and artificial rarities, given them by Daniel Colwal, Esq. and since enriched by many others. Their motto is, Nullius in verba.

RUBARB. See RHUBARB.

RUBIA TINCTORUM, a root much used by the dyers, generally called madder. See MADDER.

RUBIGO, a species of blight incident to corn, generally called mildew.

RUBRICKS, those rules and directions prefixed to the several parts of the liturgy, directing the manner and order in which each part of the office is to be performed.

They are called rubricks from the Latin *ruber*, red; because they were formerly printed with red ink, to distinguish them from the rest of the office, which was in black.

RUBUS, in botany, a genus of the icosandria polygynia class. The calix consists of five segments, and the corolla of five petals; and the berry has many seeds. There are 13 species, five of them natives of Britain, viz. the idæus, or raspberry-bush; the cæsius, or small bramble; the fruticosus, or common bramble; the saxatilis, or stone-bramble; and the chamæmorus, or cloud-berries.

RUBY, in natural history, a species of the chrostasima class of gems; being a beautiful gem of a red colour with an admixture of purple.

RUBY, in heraldry, denotes the red colour wherewith the arms of noblemen are blazoned; being the same which, in the arms of others, not noble, is called gules.

RUDDER, in navigation, a piece of timber turning on hinges in the stern of the ship, and which, opposing sometimes one side to the water and sometimes another, turns or directs the vessel this way or that. See SHIP.

The rudder of a ship is a piece of timber hung on the stern-posts by four or five iron hooks, called pintles, serving as it were for the bridle of a ship, to turn her about at the pleasure of the steers-man. The rudder being perpendicular, and withoutside the ship, another piece of timber is fitted to it at right angles, which comes into the ship, by which the rudder is managed and directed. This latter properly is called the helm or tiller; and sometimes, though improperly, the rudder itself. The power of the rudder is reduceable to that of the lever. See LEVER.

As to the angle the rudder should make with the keel, it is shewn, that in the working of ships, in order to stay or bear up the soonest possible, the tiller of the rudder ought to make an angle of 55° with the keel. A narrow rudder is best for a ship's sailing, provided she can feel it; that is, be guided and turned by it: for a broad rudder will hold much water when the helm is put over to any side; but if a ship have a fat quarter, so that the water cannot come quick and strong to her rudder, she will require a broad rudder. The aftmost part of the rudder is called the rake of the rudder.

RUDDLE, *Rubrica*, a sort of dusky red chalk, or earth, found in diverse parts of England, chiefly in iron mines.

RUDENTURE, in architecture, the figure of a rope or staff, sometimes plain, sometimes carved, wherewith a third part of the flutings of columns is frequently filled up.

RUDERATION, *Ruderatio*, a term used by Vitruvius for the laying a pavement with pebbles, or little stones; and also for the coarsest and most artless kind of masonry.

RUDIARIUS, in antiquity, a veteran gladiator, who had acquired a discharge from the service.

RUDIMENTS, *Rudimenta*, the first grounds or first principles of any art or science.

RUE, *Ruta hortensis*, a well known medicinal plant.

Rue is one of the octandria monogynia of Linnæus, and of the herbæ flore tetrapetalo anomalæ of Ray. There are many species of it, but only one of them is used in medicine; this is the common rue of our gardens. The ruta hortensis latifolia of C. Bauhine, and the ruta sativa et hortensis of other authors. It is not a native of England, but is cultivated very commonly in our gardens. Rue has always been in great esteem as an alexipharmick and cephalick; it is good in all nervous diseases, and in fevers, the small-pox and measles; and eminently so in hysterick cases: it is given by many to strengthen the stomach, and prevent the return of habitual cholicks. It has been also given in pleurisies and peripneumonies, and against the bites of venomous animals.

RULE, *Regula*, in matters of literature, a maxim, canon, or precept, to be observed in any art or sciences.

RULE, in arithmetick, denotes an operation performed with figures, in order to discover sums or numbers unknown. The fundamental rules are addition, subtraction, multiplication, and division. See ADDITION, &c. But besides these, there are other rules denominated from their use; as the rule of alligation, fellowship, interest, practice, reduction, &c. See ALLIGATION, &c.

RULE OF THREE, GOLDEN RULE, or RULE OF PROPORTION, is one of the most essential rules of arithmetick; for the foundation of which see the article GEOMETRICAL PROPORTION.

It is called the Rule of Three from having three numbers given to find a fourth, but more properly the Rule of Proportion, because by it we find a fourth number proportional to three given numbers: and because of the necessary and extensive use of it, it is called the Golden Rule. But to give a definition of it with regard to numbers of particular and determinate things, it is the rule by which we find a number of any kind of things, as money, weight, &c. so proportional to a given number of the same things, as another number of the same different things, is to a third number of the last kind of things. For the four numbers that are proportional must either be all applied to one kind of things; or two of them must be of one kind, and the remaining two of another: because there can be no proportion, and consequently no comparison of quantities of different species, as for example, of three shillings and four days; or of six men and four yards. This rule is either direct, or reciprocal, called inverse. And those are both simple and compound.

RULE *of Three Direct*, or *direct Proportion*, is when, of four numbers, the first beareth the same ratio or proportion to the second as the third doth to the fourth.

As in these, $2:8::6:24$.

Consequently, the greater the second term is, in respect to the first, the greater will the fourth term be, in respect to the third.

That

That is, as 8, the ſecond term, is four times greater than two, the firſt term; ſo is 24, the fourth term, four times greater than 6, the third term.

Whence it follows, that, if four numbers are in direct proportion, the product of the two extremes will always be equal to the product of the two means, as well in disjunct, as continual proportion.

For as $2:2\times4::6:6\times4$. Or as $3:3\times5::6:6\times5$, or $3\times6\times5=3\times5\times6$.

But $2\times6\times4=2\times4\times6$.

That is, the product of the extremes is equal to that of the means.

Again, the leſs the ſecond term is, in reſpect to the firſt, the leſs will the fourth term be, in reſpect to the third.

As in theſe, $2:8::6:24$. Here $8\times6=48=24\times2$.

But, if $24\times2=48$, then will $48\div2=24$, or $48\div24=2$.

Note, any four numbers in direct proportion may be varied ſeveral ways. As in theſe,

Viz. If $2:8::6:24$, then $2:6::8:24$, and $6:24::2:8$, or $24:6::8:2$, &c.

Theſe variations, being well underſtood, will be of no ſmall uſe in the true ſtating of any queſtion in the rule of three.

All queſtions in direct proportion may be anſwered by three ſeveral theorems.

Theorem 1. Multiply the ſecond and third terms together, and divide your product by the firſt term; the quotient will be the anſwer required.

	yds.	ſhill.	yds.	ſhill.
Thus	3:	9::	6:	18 the anſwer.
		6		

3)54(18 ſhill. { Becauſe the ſecond term was ſhillings.

Theorem 2. Divide the ſecond term by the firſt, and multiply the quotient into the third term, and the product will be the anſwer required.

yds.	ſhill.	yds.	ſhill.
3:	9::	6:	18

Thus 3) 9 (=3, then $3\times6=18$, as before.

Theorem 3. Divide the third term by the firſt, then multiply the quotient into the ſecond term, and the product will be the anſwer.

yds.	ſhill.	yds.	ſhill.
3:	9::	6:	18

Thus 3) 6 (=2, and $9\times2=18$, as before.

Here we ſee, that all the three theorems are equally true; but the firſt is moſt general, and uſually practiſed: yet the two laſt may be readily performed, when either the ſecond or third term can be divided by the firſt, and will be found of ſingular uſe in the rules of fellowſhip, &c.

Queſtion 2. If 8 lb. of tobacco coſt 14s. what will 56 lb. coſt at the ſame rate?

Thus 8 lb : 14 :: 56 lb : 4l. 18s. the anſwer.

14
224
56
8)784(=98 s.=4l. 18s.

Or thus 8) 56 (=7, then $14\times7=98$s. as before.

Queſtion 3. If 14 ſhillings will buy 8 lb. of tobacco, how much will 4l. 18s. buy after the ſame rate?

Stated thus, 14s : 8 lb :: 4l. 18 s.

Then $56\times14=784$, and 14) 784 (56 lb. the anſwer.

Queſtion 4. If 56 lb. of tobacco be worth 4 l. 18 s. how much may I buy for 14s. at the ſame rate?

Stated thus, 4 l. 18 s.=98 s : 56 lb. :: 14 s :——

Then $56\times14=784$, and 98) 784 (8 lb. the anſwer.

Queſtion 5. Suppoſe 4 l. 18 s. will buy 56 lb. of tobacco, what will 8 lb. of the ſame tobacco coſt?

This queſtion is thus ſtated, 56 lb : 4l. 18s.=98s :: 8 lb:

Then $98\times8=784$, and 56)784(=14s. the anſwer.

Note, the three laſt queſtions are only the ſecond varied, being propoſed purely to give an inſtance how any queſtion in this rule of three may be varied.

Rule *of Three Inverſe*, or *Reciprocal Proportion*, is, when, of four numbers, the third (viz. that which moves the queſtion) beareth the ſame ratio to the firſt, as the ſecond does to the fourth. Therefore, the leſs the third term is, in reſpect to the firſt; the greater will the fourth term be, in reſpect to the ſecond.

Example 1. If 16 men can do a piece of work in 6 days, how many days muſt 8 men require to do the ſame work, at the ſame rate of working? Here it is plain that 8 men muſt needs have more time than 16 men, to do the ſame work. Conſequently, the greater the third term is, in reſpect to the firſt; the leſs will the fourth term be, in reſpect to the ſecond.

Example 2. If 8 men can do a piece of work in 8 days, how many days will 16 men require to do the ſame work? Here it is plain, the fourth term muſt be leſs than the ſecond, becauſe 16 men, undoubtedly, can do the ſame work in leſs time than 8 men can. For when, according to the true meaning or deſign of any queſtion in proportion, more requires more, or leſs requires leſs, the terms are in direct proportion. But if more require leſs, or leſs requires more, as above, then the terms will be in reciprocal proportion. The manner of placing down the propoſed terms is the ſame in both rules, viz. the firſt term in the ſuppoſition muſt be of the ſame kind and denomination with the third term, which moves the queſtion; and the term ſought muſt be of the ſame kind and denomination with the ſecond term in the ſuppoſition; as in the two laſt examples.

		Men.	Days.	Men.	Days.
Thus in	Example 1.	16:	6::	8:	
	Example 2.	8:	12::	16:	

The queſtion being truly ſtated, obſerve this theorem.

Theorem. Multiply the firſt and ſecond terms together, and divide their product by the third term; the quotient will be the anſwer required.

Thus in the ſecond example $12\times8=96$.

Then 16)96(=6 days, the anſwer required.

That is, 16 men may do the ſame work in 6 days, as 8 men can do in 12 days.

The reaſon of this operation, and, conſequently, of the theorem, is grounded upon this conſideration, viz. if 8 men require 12 days to do the work, it is plain one man would require 8 times 12 days, =96 days, to do the ſame work; but if one man can do it in 96 days, moſt certain 16 men can do it in one 16th part of that time. Therefore 96, divided by 16, will give the anſwer required, viz. 16)96(6, as before, &c.

Double Rule *of Three*, or *Compound Proportion*. All queſtions in this rule, where five numbers are propoſed to find a ſixth, may more eaſily and readily be anſwered by one general theorem, which compriſeth both the direct and inverſe rules. But, firſt, you muſt carefully note, that in all queſtions of this nature, three of the five propoſed terms are always conditional and ſuppoſed; and that the other two move the queſtion, as for inſtance:

Example. If 100 l. will gain 6 l. in 12 months, (theſe three terms are only ſuppoſed, or conditional) then comes the queſtion, what will 300l. gain in 9 months? Now, in order to raiſe the general theorem, let us ſuppoſe, inſtead of the numbers, theſe letters:

Viz. let { P = 100 the principial. T = 12 the time. G = 6 the gain. } { In the ſuppoſition of any propoſed queſtion.

And { p = 300 the principial. t = 9 the time. g = 13,5 the gain. } { The three terms wherein the queſtion lies.

Then $P:G::p:\frac{Gp}{P}=$ { The product of the two means, divided by the firſt extreme.

That is $100:6:300:\frac{300\times6}{100}=18$, which is the firſt part of the queſtion.

Then $T:\frac{Gp}{P}::t:g$
Viz. $12:18::g:13,5$ } { Which is the ſecond part of the queſtion.

Then $T:\frac{Gp}{P}::t:g$
Viz. $12:18::g:13,5$ } { That is, the product of the extremes is equal to that of the means.

Conſequently, $TgP=Gpt$ is the theorem.

This theorem affords two rules, by which all queſtions in this double rule of three, or rather of five numbers, may be reſolved; due regard being had to the true placing down of the propoſed terms, which muſt be thus. Always place the three conditional terms in this order: let that number which is the principal cauſe of gain, loſs, or action, &c. (viz. P) be put in the firſt place; that number which denotes the ſpace of time, or diſtance of place, &c. (viz. T) be put in the ſecond place; and that number which is the gain, loſs, or action, in the third place. Now, according to theſe directions, the conditional terms of the laſt queſtion will ſtand

Thus, P. T. G.

That

That done, place the two terms which move the queftion underneath thofe of the fame name

Thus $\begin{cases} P.\ T.\ G. \\ p.\ t. \end{cases}$

Then, if the blank, or term fought, fall under the third place, as in this queftion,

It will be $\frac{G p t}{T P} = g$, which gives this rule.

Rule 1. Multiply the three laft terms together for a dividend, and the two firft together for a divifor, the quotient arifing from them will be the fixth term

That is, in our propofed example 1.

Thus $6 \times 300 \times 9 = 16200$, the dividend,

And $100 \times 12 = 1200$, the divifor.

Then $1200)16200(13\frac{1}{2}$, the anfwer, as before.

But, if the blank or term fought, fall under the firft place, then

It will be $\left\{ \frac{T g P}{t G} = p. \right.$

Or, if the blank fall under the fecond place,

It will be $\left\{ \frac{T g P}{G p} = t \right.$; either of thefe gives this rule.

Rule 2. Multiply the firft, fecond, and laft terms together for a dividend, and the other two together for a divifor, the quotient arifing from them will be the fixth term

RULE, among workmen, implies an inftrument, on which are feveral lines, as inches, &c. of great ufe in practical menfuration, &c.

Carpenters Joint RULE, is an inftrument ufually made with box, 24 inches long, and $1\frac{1}{2}$ broad; each inch being fubdivided into 8 parts. On the fame fide with thefe divifions is ufually added Gunter's line of numbers. On the other fide are the lines of timber and board meafure; the firft beginning at 82, and continued to 36, near the other end; the latter is numbered from 7 to 36, 4 inches from the other end.

Coggefhall's Sliding RULE, is chiefly ufed for meafuring the fuperficies and folidity of timber, &c. It confifts of two rulers, each a foot long, one of which flides in a groove made along the middle of the other.

On the fliding fide of the rule are four lines of numbers, three whereof are double; that is, are lines to two radiufes; and one, a fingle broken line of numbers: the three firft are figured 1, 2, 3, &c. to 9; then, 1, 2, 3, &c. to 10; their conftruction, ufe, &c. being the fame as thofe of Everard's fliding rule. The fingle line, called the girt line and marked D, whofe radius is equal to the two radiufes of any of the other lines, is broke for the eafier meafurement of timber, and figured 4, 5, 6, 7, 8, 9, 10, 20, 30, &c. From 4 to 5 it is divided into 10 parts, and each tenth fubdivided into 2, and fo on, from 5 to 6, &c.

On the backfide of the rule are, 1. A line of inch-meafure, from 1 to 12; each inch being divided and fubdivided. 2. A line of foot-meafure, confifting of one foot, divided into 100 equal parts, and figured 10, 20, 30, &c. The back part of the fliding piece is divided into inches, halves, &c. and figured from 12 to 24; fo that, when drawn wholly out, there may be a meafure of two feet.

RUM, a fpecies of vinous fpirit diftilled from the juice of fugar-canes.

The unctuous or oily flavour of rum is often fuppofed to proceed from the large quantity of fat ufed in boiling the fugar; which fat, indeed, if coarfe, will ufually give a ftinking flavour to the fpirit, in our diftillations of the fugar-liquor, or wafh, from our refining fugar-houfes; but this is very different from the flavour of the rum, which is really the effect of the natural flavour of the cane.

The method of making rum is this: when a fufficient ftock of the materials is got together, they add water to them, and ferment them in the common method, though the fermentation is always carried on very flowly at firft; becaufe, at the beginning of the feafon for making rum in the iflands, they want yeaft, or fome other ferment to make it work; but by degrees, after this, they procure a fufficient quantity of the ferment, which rifes up as a head to the liquor in the operation, and thus they are able afterwards to ferment and make their rum with a great deal of expedition, and in large quantities.

When the wafh is fully fermented, or to a due degree of acidity, the diftillation is carried on in the common way, and the fpirit is made up proof; though fometimes it is reduced to a much greater ftrength, nearly approaching to that of alcohol or fpirit of wine, and it is thus called double diftilled rum. It might be eafy to rectify the fpirit, and bring it to much greater purity than we ufually find it to be of; for it brings over in the diftillation a very large quantity of the oil; and this is often fo difagreeable, that the rum muft be fuffered to lie by a long time to mellow before it can be ufed; whereas, if well rectified, it would grow mellow much fooner, and would have a much lefs potent flavour.

The beft ftate to keep rum in, both for exportation and other ufes, is doubtlefs that of alcohol, or rectified fpirit. In this manner it would be tranfported in one half the bulk it ufually is, and might be let down to the common-proof-ftrength with water when neceffary: for the common ufe of making punch, it would likewife ferve much better in the ftate of alcohol; as the tafte would be cleaner; and the ftrength might always be regulated to a much greater exactnefs than in the ordinary way.

Rum is ufually very much adulterated in England, fome are fo bare-faced as to do it with malt fpirit: the taftes of both are fo nearly allied, that it is not eafily difcovered. The beft method of judging of it is, by fetting fire to a little of it; and when it has burnt away all the inflammable part, examining the phlegm both by the tafte and fmell.

RUMEN, in comparative anatomy, the paunch, or firft ftomach, of fuch animals as chew the cud, thence called ruminant animals.

RUN, the after-part of a fhip's bottom both within or without, which grows narrower as it approaches the ftern-poft.

RUNDULET, or RUNLET, a fmall veffel containing an uncertain quantity of any liquor, from three to twenty gallons.

RUNNET, or RENNET, the acid juice found in the ftomachs of calves that have fed on nothing but milk, and are killed before the digeftion is perfect.

RUNNING *of Goods*, a clandeftine landing of goods, without paying the legal cuftoms or duties for the fame.

RUPEE, ROUPIA, or ROUPIAS, names of gold and filver coin, current in the E. Indies.

RUPTURE, in furgery, the fame with hernia. See HERNIA.

RURAL, fomething relating to the country.

RUST, *of a Metal*, the flour or calx of it procured by corroding and diffolving its fuperficial parts by fome diffolvent.

RUST *of Corn*, in hufbandry, implies a difeafe in corn, and other vegetables. in which their ftalks and leaves appear as if burnt up, and of a rufty colour.

RUSTICK, in architecture, implies a manner of building in imitation of nature, rather than according to the rules of art.

RUSTICK *Work*, is that where the ftones in the face, &c. of a building, inftead of being fmooth, are notched or picked with the point of a hammer.

RUSTICK *Order*, is that decorated with ruftick quoins, ruftick work, &c.

RUT, among hunters, implies the venery or copulation of deer.

RYE, a fpecies of corn greatly cultivated in the northern parts of England.

Mr. Miller is of opinion that all the rye fown in England is of the fame fpecies, though diftinguifhed by farmers into two varieties of winter and fpring rye, as he has not been able, by the moft fedulous experience, to find any difference.

The winter rye, which has the largeft grain, is what the generality of the farmers cultivate. It is ufually fown in autumn, at the fame time as wheat; and in many of our northern countries, as well as in Wales, they are often mixed and fown together; though, as Mr. Miller rightly obferves, this muft be very bad hufbandry, becaufe the rye will always ripen fooner than the wheat; fo that if the latter be fuffered to ftand till fully ripe, the grain of the former will fhed; nor can this be practifed where the people are not accuftomed to eat rye-bread: for though fome account it good when mixed, it is fo very clammy that few who have been ufed to wheaten bread will ever relifh it.

Rye is generally fown on poor, lime-ftone, dry, gravelly, or fandy foils, where wheat will not thrive, and in fuch places it does very well. The ground fhould be dry when it is fown: for if much rain falls, even after the fowing,

ing, before the rye is come up, it often rots in the earth. It indeed riſes in a much ſhorter time than wheat.

When ſown upon light land, it ripens much earlier than on a cold ſtiff ground, and by continuing to ſow it in ſuch a ſoil during two or three years, it will be forwarded ſo much as to ripen a month earlier than that which has been long raiſed upon ſtrong, cold ground. For this reaſon, thoſe who are obliged to ſow rye toward ſpring, generally provide themſelves with this early ſeed. A little ſprinkling of dung or mud, though it be but half the quantity commonly uſed for other corn land, will, if laid upon the rye ground, greatly advance the crop. The uſual allowance is two buſhels of ſeed to a ſtatute acre, or, if it be new broke up ground, or land ſubject to worms, about a peck more; and the produce commonly is about 20 buſhels upon an acre.

In the ſummer of the year 1699, which was uncommonly dry, Mr. Mortimer reckoned 90 grains apiece in ſeveral ears of rye.

The ſmall rye may be ſown in the ſpring, about the ſame time as oats, and uſually ripens as ſoon as the other ſort: but if the ſeaſon prove wet, it is apt to run much to ſtraw, and the grain is generally lighter than the other. The chief uſe of this ſort is to re-ſow lands where the autumnal crop has failed.

This corn is ripe when its ſtraw turns yellow, its ear hangs, and its grain is hard. It is not very apt to ſhed; and therefore, if it be weedy (though this ought never to be the caſe with any corn) it ſhould be let lie upon the ground, or gravel, as ſome call it, a week or ten days after it is cut, if the weeds do not dry ſooner, before it be bound up; for otherwiſe thoſe weeds will give in the barn, make the rye not thraſh well, and render it muſty. But as this grain will grow in the ear ſooner than any other, if it be wet, particular care muſt be taken, eſpecially if rain comes on, to turn it at leaſt once in two or three days, and lay the ears upon the ſtubble, as high above the ground as can be. This will help to preſerve it from hurtful moiſture: but if it be cut in perfectly dry weather, and without weeds, it may be houſed as it is reaped.

The general uſe of rye is for bread, either alone, or mixed with wheat, in which ſtate it is called meſlin corn. It alſo yields a ſtrong ſpirit when diſtilled; and, if ſowed only for dreſſing of land, is of vaſt ſervice to the ground where it is plowed in green and ſucculent. The Reverend Dr. Eliot informs us, that he has not only been told, but knows by his own obſervation, that if rye be ſowed ſucceſſively every year upon the ſame land, both the crop and the land will be greatly improved, inſomuch that ſome grounds which would yield but five buſhels to the acre at firſt, have, in time, afforded a crop of 15 buſhels to the acre, without the charge of dung, or any manure. But it ſhould be remembered that the land ſown by Dr. Eliot, was newly broken up.

This plant is likewiſe ſown in autumn to great advantage, for green feed for cattle, particularly for ewes and lambs in the ſpring, before there is plenty of graſs. When this is intended, the rye ſhould be ſown early, that it may have ſtrength to furniſh early fodder. In this light, it ſupplies the want of turneps where they have failed, or where their ſeaſon is over: ſo that, in ſuch caſes, it is very good huſbandry to ſow the land with rye, eſpecially where there are flocks of ſheep, which cannot be well ſupported without green food early in the ſpring. The farmer who has many ſheep ſhould conſider, that turneps are always a very precarious crop; and therefore he ſhould, beſide ſowing ſome places with cole-ſeed, in order to have green fodder, ſow rye in others, to guard againſt accidents. If ſome of the ground ſowed late with turneps, which have failed, be ſown in the autumn with rye, he will find it turn to good account. To have green fodder for cattle in April, which is the ſcarceſt time of all the year, ſome ſplit the ridges of their wheat-ſtubble, and ſow them with rye, allowing about a buſhel to an acre, which they harrow in, and feed about April, or when they want it; and in May they plough it up for a fallow.

Rye-Grass, a ſpecies of graſs often ſown with clover, allowing 10 pounds of clover and one buſhel of rye-graſs to an acre; but this is only to be done where the land is deſigned to remain but three or four years in paſture, as neither the rye-graſs or clover are of long duration; and it certainly is a wrong, though too general practice, to ſow rye-graſs with barley, for the corn muſt conſiderably draw away the nouriſhment from the graſs, ſo as to leave but half a crop of graſs when the barley is off the ground.

S.

S, The 18th letter, and 14th conſonant of our alphabet; the ſound of which varies, being ſtrong in ſome words, as this, thus, &c. and ſoft in words which have a final e, as muſe, wiſe, &c. It is generally doubled at the end of words, whereby they become hard and harſh, as in kiſs, laſs, &c. In ſome words it is ſilent, as iſle, iſland, viſcount, &c. In writing or printing, the long character ſ, is uſed at the beginning and middle of words, but the ſhort s, at the end.

In abbreviations, S. ſtands for ſocietas, or ſocius, i. e. fellow of the royal ſociety. In medicinal preſcriptions, S. A. ſignifies ſecundum artem, i. e. according to the rules of art. Uſed as a numeral, S anciently denoted ſeven.

SABÆANS, in church hiſtory, a ſet of idolaters, much more ancient than the Jewiſh law. The Sabæans began with worſhipping the heavenly bodies, which they imagined were animated with inferior deities. In the conſecration of their images, they uſed many incantations to draw down into them from the ſtars, thoſe intelligences for which they erected them, whoſe power and influence, they held, afterwards dwelt in them. This religion, it is ſaid, firſt began among the Chaldæans, with their knowledge in aſtronomy; and from this it was, that Abraham ſeparated himſelf, when he came out of Chaldæa. From the Chaldæans it ſpread all over the Eaſt; and from thence to the Grecians, who propagated it to all the nations of the known world. The remainder of this ſect ſtill ſubſiſts in the Eaſt, and pretend to derive their name from Sabius, a ſon of Seth; and among the books in which the doctrines of this ſect are contained, they have one which they call the Book of Seth, and which, they pretend, was written by that patriarch.

SABBATH, or the day of reſt, a ſolemn feſtival of the Jews, on the ſeventh day of the week, or Saturday, beginning from ſun-ſet on Friday, to ſun-ſet on Saturday. The obſervation of the ſabbath began with the world; for God, having employed ſix days in its creation, appointed the ſeventh as a day of reſt, to be obſerved by man, in commemoration of that great event. As the ſeventh day was a day of reſt to the people, ſo was the ſeventh year to the land; it being unlawful in this year to plow or ſow, and whatever the earth produced, belonged to the poor; this was called the ſabbatical year. The modern, as well as the ancient Jews, are very ſuperſtitious in the obſervance of the ſabbath; they carry neither arms, nor gold, nor ſilver about them, and are permitted neither to touch theſe, nor a candle, nor any thing belonging to the fire; on which account they light up lamps on Friday, which burn till the end of the ſabbath.

There is at preſent a ſect of Baptiſts called ſabbatarians, from their obſerving the ſeventh day of the week, as a day ſet apart for the worſhip of God: they attempt to juſtify this practice by alledging that the Jewiſh ſabbath was never abrogated in the New Teſtament; and that where God has given a command, it is our duty to obſerve it till he has abrogated or altered it by a new command. See Sunday.

SABELLIANS, a ſect of Chriſtians of the third century,

century, that embraced the opinions of Sabellius, a philosopher of Egypt, who openly taught that there is but one person in the Godhead.

The Sabellians maintained, that the Word and the Holy Spirit are only virtues, emanations, or functions of the Deity; and held that he who is in heaven is the father of all things, descended into the virgin, became a child, and was born of her as a son; and that having accomplished the mystery of our salvation, he diffused himself on the apostles in tongues of fire, and was then denominated the Holy Ghost. This they explained by resembling God to the sun, the illuminative virtue or quality of which was the Word, and its warming virtue the Holy Spirit. The Word, they taught, was darted, like a divine ray, to accomplish the work of redemption; and that being re-ascended to heaven, the influences of the Father were communicated after a like manner to the apostles.

SABLE, in heraldry, denotes the colour black, in coats of arms belonging to gentlemen; but in those of noblemen it is called diamond; and in those of sovereign princes, saturn. It is expressed in engraving, by perpendicular and horizontal hatches crossing one another.

SABRE, a kind of sword, or scimeter, with a very broad and heavy blade, thick at the back, and a little falcated or crooked towards the point. It is the ordinary weapon worn by the Turks, who are said to be very expert in the use of it.

SACK, in law, is said to be an antient privilege, which the lord of a manor claims of holding his court, in causes of trespass among his tenants, and imposing fines for the same.

SACCHARUM SATURNI, SUGAR of LEAD. Some have ventured to give sugar of lead internally, in doses of a few grains, as a styptick, in hæmorrhages, profuse colliquative sweats, seminal fluxes, the fluor albus, &c. and, indeed, it must be allowed, that it very powerfully restrains the discharge; but then it occasions other symptoms, often dangerous, and sometimes fatal, as violent cholick pains, obstinate constipations, cramps, tremours, &c. so that its internal use seems by no means innocent.

SACCULUS, in anatomy, a diminutive of saccus, signifies a little bag: as, 1. The sacculus lachrymalis, which is a little bag, into which the puncta lachrymalia of the eye open. 2. The sacculus cordis, or pericardium. 3. The sacculus chyliferus, the beginning of the thoracick duct, more usually called receptaculum chyli. 4. Sacculi adiposi, or the adipose cells, &c.

A topical application, inclosed in a linen bag, is also termed sacculus medicinalis; as is a bag filled with medicinal simples, and suspended in a liquor, in order to make a diet-drink.

SACCUS JUGULARIS, the jugular-sack, in anatomy, a receptacle formed at the termination of the internal jugular vein; the use of which is to bring back the blood from the sinuses of the dura mater, and from the brain.

SACERDOTAL, something belonging to priests.

SACK *of Wool*, a quantity of 100½ to 400 weight.

SACKS *of Earth*, in fortification, are canvas bags filled with earth. They are used in making retrenchments in haste, to place on parapets, or the head of the breaches, or to repair them when beaten down.

SACKBUT, a musical instrument of the wind kind, being a sort of trumpet, though different from the common trumpet, both in form and size: it is fit to play a bass, and is contrived to be drawn out, or shortened, according to the tone required, whether grave or acute. The Italians call it trombone, and the Latins tuba ductilis.

SACER ARTERIÆ, in anatomy, a branch of the aorta descendens, which passes through the middle of the os sacrum to the pelvis.

SACRAMENT, *Sacramentum*, signifies, in general, a sign of a thing sacred and holy; and is defined to be an outward and visible sign of a spiritual grace. Thus there are two objects in a sacrament, the one the object of the senses, and the other the object of faith: Protestants admit only of two sacraments, baptism, and the eucharist, or Lord's supper: but the Roman catholicks own seven, viz. baptism, confirmation, the eucharist, penance, extreme unction, ordination, and marriage.

SACRED, something holy, or that is solemnly offered, and consecrated to God with ceremonies, benedictions, unctions, &c.

SACRED, is also applied to things belonging to God and the church.

SACRIFICE, a solemn act of religious worship, which consists in the dedicating, devoting, or offering up something, animate or inanimate, on an altar by the hands of a priest to acknowledge a dependence on or to conciliate the favour of the Deity. This practice in some sense or other is universal, for all religions have their sacrifices.

Some ascribe the rise of sacrifices to the barbarity and ignorance of the heathen world, and, as to the Jews, they borrowed this practice from the Egyptians in which God suffered them to continue, being contented with barely reforming it.

SACRILEGE, the crime of profaning sacred things, or things devoted to God; or of alienating to laymen, or common purposes, what was given to religious persons, or pious uses.

SACRISTA, or SACRISTAN, a church officer, otherwise called a sexton.

SACRISTY, *Sacristia*, a place or apartment in a church where the vessels, and other utensils and ornaments of the church are preserved, &c. It is now generally called, among us, a vestry.

SACRO-LUMBARIS *Musculus*, in anatomy, a muscle arising fleshy from the superior part of the os sacrum, posterior part of the ilium, and from all the spines and transverse processes of the vertebræ of the loins. It gives a small tendon to the posterior part of each rib near its root, where a small bundle of fleshy fibres arises and unites with each ascending tendon to the third, fourth, fifth, and sixth vertebræ of the neck.

This, with the serratus posticus inferior and triangularis, help to contract the ribs in exspiration. But they are all of small force, and seem only to accelerate the motion of the ribs, which fall down chiefly by their own gravity, and the elasticity of the ligaments by which they are tied to the vertebræ.

SACRUM Os, in anatomy, a bone situated in the posterior or lower part of the trunk, at the basis by which the whole spine is supported, and from hence it has been by some termed os basilaxe.

SADDLE, is a seat upon a horse's back, contrived for the conveniency of the rider.

SADDLES, amongst seamen, a sort of wooden crutches nailed on the upper side of the main and fore-yard-arms, whereon to fix the studding-sail booms, which slide out upon them when the studding-sails are to be set.

SADDUCEES, in Jewish antiquity, a famous sect among the ancient Jews, so called from their founder Sadock Antigonus of Socho, president of the Sanhedrim at Jerusalem, and teacher of the law in the principal divinity-school of that city. Having often, in his lectures, asserted to his scholars, that they ought not to serve God in a servile manner, with respect to reward, but only out of filial love and fear; two of his scholars, Sadock and Baithus, inferred from thence, that there were no rewards or punishments after this life; and, therefore, separating from the school of their master, they taught that there was no resurrection, nor future state. Many embracing this opinion, gave rise to the sect of the Sadducees, who were a kind of Epicureans, but differing from them in this, that though they denied a future state, yet they allowed the world was created by the power of God, and governed by his providence; whereas the followers of Epicurus denied both.

The Sadducees denied all manner of predestination whatever, and not only rejected all unwritten traditions, but also all the books of the Old Testament, excepting the Pentateuch.

SAFE-CONDUCT, a security given by the king under the great seal to a foreigner, for his safe coming into and passing out of the kingdom.

SAFE-GUARD, a protection formerly granted to a stranger, who feared violence from some of the king's subjects, for seeking his right by course of law.

SAFFRON, *Crocus*, in botany, &c. See CROCUS.

SAGAPENUM, a vegetable juice, generally called a gum, but it is truly a gum resin. It is brought to us from Persia and the E. Indies. The plant which produces it has never been described, but is supposed to be, as Dioscorides says, of the ferula kind, from the seeds and fragments of the stalks sometimes met with in the body of it.

Sagapenum

Sagapenum is a very great attenuant, aperient, and diſcutient; it is good in all diſorders of the breaſt that owe their origin to a tough phlegm. It has alſo been found to diſcuſs tumours in the nervous parts, in a remarkable manner, and to give relief in habitual head-achs, where almoſt all things elſe have failed. Its doſe is from 10 grains to two ſcruples, but it is now ſeldom given alone.

SAGATHEE, in commerce, a ſlight woollen ſtuff; being a kind of ſerge, or ratteen; ſometimes mixed with a little ſilk. It is chiefly manufactured at Amiens, though we have our ſhare in England.

SAGE, *Salvia*, a medicinal herb, of which there are many ſpecies, but only two of them are uſed in our ſhops. Theſe are there diſtinguiſhed by the names of ſalvia hortenſis major, and ſalvia hortenſis minor. In Engliſh we diſtinguiſh them by thoſe of common ſage, or red ſage, and ſage of virtue.

The common red ſage has always been eſteemed as a cephalick and ſudorifick. An infuſion of it, made in the manner of tea, has been long famous, as the common drink of people in fevers. It is attenuant and diuretick; it promotes the menſes, and is good in vertigoes, tremours, palſies, and in catarrhs. The virtues and uſes of the ſage of virtue are the ſame with the other. Its name indeed has made many prefer it to the common ſage for the making tea for people in fevers; but the more agreeable flavour of the common kind, and the pleaſant colour of the infuſion, when a little lemon juice is added, have again of late reſtored it into general uſe.

SAGITTA, the arrow or dart, in aſtronomy, a conſtellation of the northern hemiſphere near the Eagle. The ſtars in this conſtellation in Tycho's and Ptolemy's catalogues are 5, and in Mr. Flamſtead's 23.

Sagitta, in botany, implies the top of any ſmall twig, cyon, or graft of a tree.

Sagitta, in trigonometry, the ſame with the verſed ſine of an arch.

SAGITTAL Suture, in anatomy, the ſecond of the genuine ſutures of the cranium or ſkull.

SAGITTARIUS, the archer, in aſtronomy, the ninth ſign of the zodiack, (*plate* IV. *fig.* 9.) marked thus, ♐, in books. The ſtars in this conſtellation in Ptolemy's catalogue are 31, in Tycho's 16, and in Mr. Flamſtead's 52.

SAGO, a ſimple brought from the E. Indies, of conſiderable uſe in diet as a reſtorative. Sago is a ſort of bread produced in the following manner, from a tree called landan, growing in the Molucco's. When a tree is felled, they cleave it in two, in the middle, and dig out the pith, which is eatable when it comes freſh out of the tree. They pound it in a mortar, till it is reduced into a kind of powder ſomewhat like meal. Then they put it in a ſearce made of the bark of the ſame tree, placing it over a ciſtern made of its leaves, and pour water on it, which ſeparates the pure part of the powder from the woody fibres wherewith the pith abounds. The flour thus filtrated they call ſagu, which they make into paſte, and bake it in earthen furnaces.

SAICK, or Saique, a Turkiſh veſſel, very common in the Levant for carrying of merchandize.

SAIL, in navigation, an aſſemblage of ſeveral breadths of canvas, ſewed together by the liſts, and edged round with a cord, called a belt rope. The motion of ſailing communicated to the ſhip is thus elegantly deſcribed by the ingenious M. Bouguer.

When a ſhip ſails out of a harbour, ſhe acquires her motion by infinitely ſlow degrees, much after the ſame manner as heavy bodies, in their fall, arrive not at a certain velocity, but by an infinite repetition of the action of their weight.

The firſt impulſions of the wind greatly affect the velocity, becauſe the reſiſtance of the water might deſtroy them; for the velocity being at firſt ſmall, the reſiſtance of the water, which depends thereon, will be very weak; but the faſter the ſhip goes, the leſs will be the force of the wind on the ſails; whereas it is quite otherwiſe with reſpect to the impulſion of the water on the bow, becauſe it augments in proportion to the velocity with which the ſhip ſails. So the new degrees which the effort of the ſails adds to the motion of the ſhip, are continually decreaſing; whilſt, on the contrary, thoſe which diminiſh the reſiſtance of the bow are continually encreaſing. The velocity is accelerated in proportion as the quantity added is greater than that ſubtracted; but, when theſe two powers become equal, when the impulſion of the wind on the ſails has loſt ſo much of its force as not to act, but in proportion to the force with which the reſiſtance of the water acts on the bow, in the oppoſite ſenſe, the ſhip will then go no faſter, and will ſail with a conſtant uniform motion. The great weight of the ſhip may be the cauſe of the ſhip's being ſo long in coming to her greateſt velocity; but this weight makes nothing to the degree of velocity; and when the ſhip has once come to it, ſhe afterwards goes on by her own intrinſick motion, and ſhe can neither gain nor loſe any new degree of velocity. She moves as by her own proper force in vacuo, without being afterwards ſubject either to the effort of the wind on the ſails, or the reſiſtance of water on the bow. If at any time the impulſion of the water on the bow ſhould deſtroy any part of the velocity, the impulſion of the wind on the ſails will repair it, ſo the motion will continue the ſame; but it muſt be obſerved, this will only be when theſe two powers act in a direction quite contrary to one another: otherwiſe they will not mutually deſtroy one another. The whole theory of working ſhips depends upon this oppoſition and perfect equality which ſhould ſubſiſt between the impulſion of the water and the impulſion of the wind.

SAILING, in a general ſenſe, implies the art or act of navigating; or of determining the various motions of a ſhip, and her true place at any time.

Plane, or *Plain* Sailing, is that performed by means of the plane chart.

Before we proceed to ſhew the method of ſolving the ſeveral caſes of plane ſailing, it may be neceſſary to obſerve, that the diſtance ſailed, difference of latitude, and the departure, or difference of longitude, conſtantly form a right-angled triangle, and the courſe ſteered, and the complement of the courſe, are the two oblique angles of the ſame triangle. For ſuppoſe a ſhip at L (*plate* LXXI. *fig.* 7.) ſails on a direct courſe till ſhe arrives at M; then will LM repreſent the diſtance ſailed, LN, the difference of latitude, NM the departure, or difference of longitude, and the angle NLM, the courſe ſteered, conſtituting the right-angled triangle LMN, right-angled at N. Whence it follows, that if any two of theſe are given, we can by trigonometry find the reſt.

Caſe. I. One latitude, courſe, and diſtance ſailed being given, to find the other latitude, and departure from the meridian.

Example. Suppoſe a ſhip, in the latitude of 4d. 10m. north, ſails S. S. W. 194 miles; required the latitude ſhe is in, and how far ſhe hath departed from her former meridian?

1. For the difference of latitude, the proportion will be,

As radius —— —— = 90d. 00m. = 10.0000000
To the diſtance —— —— = 194 = 2.2878017
So is the co-ſine of the courſe = 67d. 30m. 9.9656153

To the difference of latitude —— = 179 = 2.2534170

2. For the departure, or ſide,

As radius —— —— = 90d. 00m. = 10.0000000
To the diſtance ſailed —— —— = 194 = 2.2878017
So is the ſine of the courſe 22d. 30m. = 9.6006997

To the departure required —— = 77 = 1.8885014

Caſe II. Both latitudes and courſe being given, to find the diſtance and departure.

Example. Suppoſe a ſhip, in the latitude of 3d. 10m. ſouth, ſails N. E. by N. till her diſtance of latitude be 2d. 20m.; required the diſtance ſailed, and departure from the meridian?

1. To find the diſtance ſailed, it will be,

As the comp. of the courſe = 56d. 15m. = 9.9198464
To the difference of latitude = 140 —— = 2.1461280
So is radius —— —— = 90d. —— = 10.0000000

To the diſtance required —— = 168,4 = 2.2262816

2. For the departure, the proportion will be,

As radius —— = 90 —— = 10.0000000
To the diſtance —— = 168,4 —— = 2.2262816
So is the ſine of the courſe, —— = 33d. 45m. = —— —— } 9.7447390

To the departure required —— = 93,5 = 1.9710206

Caſe III. Both latitudes and diſtance ſailed being given, to find the courſe and departure.

Examples.

SAI

Example. Admit a ſhip, in the latitude of 1d. oom. ſouth, ſails between the north and eaſt 96 miles, till her difference of latitude be 1d. 10m: required the courſe and departure?

1. To find the courſe, it will be,
As the diſtance ſailed — =96 — =1.9822712
To radius — =90d. oom. =10.0000000
So is the diff. of latitude=70 — =1.8450980

To the S. of the comp. courſe=46d. 49m. =9.8628268
Which being taken from 90d. gives 43d. 11m. the courſe ſteered, and, becauſe the courſe was between the north and eaſt, it is north 43d. 11m. eaſterly, or nearly N. E. by N. 3 quarters eaſterly.

2. For the departure, the proportion will be,
As radius — =90d. oom. — =10.0000000
To the diſtance — =96 — = 1.9822712
So is the ſine of the courſe, 43d. 11m. = 9.8352688

To the departure W X — =65,7 — =1.8175400

Caſe IV. Both latitudes and departure being given, to find the courſe and diſtance?

Example. Suppoſe a ſhip, in the latitude 2d. oom. ſouth, ſails between the ſouth and eaſt, till her difference of latitude be 2d. 10m. and her departure 96 miles eaſt; required her direct courſe and diſtance?

1. To find the courſe, it will be,
As the difference of latitude — =130 — =2.1139434
To radius — =90d. oom. =10.0000000
So is the departure — =96=1.9822712

To the T. of the courſe required=36d. 27m. =9.8683278
Which, becauſe ſhe ſailed between the ſouth and eaſt, is ſouth 36d. 27m. eaſterly, or almoſt S. E. by S. one quarter eaſterly.

2. To find the diſtance ſailed, it will be,
As the ſine of the courſe=36d. 27m. =9.7738749
Is to the departure — =96 — =1.9822712
So is radius — =90d. oom. =10.0000000

To the diſtance ſailed — =161,5=2.2083963

Caſe V. One latitude, diſtance, and departure being given, to find the other latitude and courſe ſteered.

Example. A ſhip at ſea, in the latitude of 1d. oom. north, ſails between the north and weſt 120 miles, having departed to the weſtward of her former meridian 96 miles; required her direct courſe, and the difference of latitude?

1. To find the courſe, the proportion will be,
As the diſtance ſailed — =120 — =2.0791812
To radius — =90d. oom. — =10.0000000
So is the departure — =96 — =1.9822712

To the ſine of the courſe — 53d. 27m. =9.9030900
That is, north 53d. 7m. weſterly, or almoſt N. W. 3 quarters weſterly.

2. For the difference of latitude, it will be,
As radius — =90d. oom. — =10.0000000
To the diſtance ſailed — =120 — =2.0791812.
So is the co-ſine of the courſe — 53d. 07m. =9.7782870

To the difference of latitude=72 — — =1.8574682

Caſe VI. One latitude, courſe, and departure being given, to find the other latitude and diſtance ſailed.

Example. Suppoſe a ſhip, in the latitude of 3d. 10m. ſouth, ſails N. W. by N. till her departure be 90 miles, required her direct diſtance, and the latitude ſhe is in?

1. To find the diſtance ſailed, it will be,
As the ſine of the courſe — =33d. 45m. =9.7447390
To the departure — =90 — =1.9542425
So is radius — 90d. oom. =10.0000000

To the diſtance — =162 — 2.2095035
And in the ſame manner may the latitude be eaſily found.

Mercator's Sailing, the method of performing the ſeveral caſes of ſailing according to Mercator's projection; or that of delineating the earth's ſuperficies in plano, in ſuch a manner, as that the meridians be ſtraight lines, parallel to, and equidiſtant from each other. The parallels of latitude are alſo ſtraight lines, and parallel to one another, but the diſtance between them increaſes from the equinoctial towards either pole, in the ratio of the ſecant of the latitude to the radius.

If the ſuperficies of the terreſtrial globe be ſuppoſed to be taken off, and extended on a plane, ſo as to make the meridians parallel to each other, and the degrees of longitude every where equal, it is eaſy to conceive that it muſt be productive of moſt notorious errors; for an iſland in latitude 60d. where the radius of the parallel is only equal to one half of the radius of the equator, will have its length from eaſt to weſt diſtorted in a double ratio to what it was on the globe; that is, its length from eaſt to weſt, in compariſon of its breadth from north to ſouth, will be repreſented in a double proportion to what it really is; whence it follows, that in whatever proportion the degrees of any parallel are increaſed or diminiſhed, by a projection in plano, the degrees of longitude ought to be increaſed or diminiſhed in the ſame ratio; for otherwiſe the true bearings and diſtances of places will be loſt, as in the caſe of the plain-chart, where the degrees of latitude and longitude are all equal.

Though this projection is generally called Mercator's projection, yet our countryman, Mr. Wright, had long before invented it, demonſtrated its uſe, and ſhewn a ready way of conſtructing it, by enlarging the meridian line by a continued addition of ſecants; but neither of theſe gentlemen is thought the original author of it as being hinted by Ptolemy near 2000 years ago.

Having thus ſhewn the nature of this projection, we now ſhall proceed to ſhew the method of ſolving the ſeveral caſes of Mercator's ſailing.

Caſe I. The latitudes and longitudes of two places being given, to find the courſe and diſtance between them.

Example. Required the direct courſe and diſtance between the Lizard in the latitude of 50d. oom. north, longitude 5d. 14m. weſt, and a port in the latitude of 32d. 20m. north, and longitude 17d. 30m. weſt?

Geometrically. 1. Draw the merid. *b k d (plate* LXXI. *fig.* 6.) and from *b*, the Lizard, ſet off the meridional difference of latitude to *d*; through *d* draw the parallel *c d*, ſetting off on it the difference of longitude from *d* to *c* and draw the line *b c*; then will *c* repreſent the given port.

2. Make *b k* equal to the proper difference of latitude, and draw *k l* parallel to *d c*. Then will the angle *c b d* be the direct courſe, *b l* the diſtance, and *k l* the departure, which may be meaſured, the courſe by the line of chords, and the diſtance *b l* by the ſcale of equal parts.

As all the caſes of Mercator's ſailing are projected after the ſame manner, we ſhall, for the ſake of brevity, omit it in the following caſes:

Arithmetically. As *b d*, the meridional difference of latitude — 1422,5 — } 3.1530523
Is to radius — 90d. oom. — — 10.0000000
So is *d c*, the difference of longitude — 736 — 2.8671728

To the tangent of the angle *c b d*, the direct courſe=27d. 22m. — } 9.7141205
Which is ſouth 27d. 22m. weſterly, or nearly ſouth ſouth weſt a quarter weſterly, becauſe the port lies to the weſtward of the Lizard.

Then, to find *b l* the diſtance, it will be,
As radius — 90d. oom. 10.0000000
To *b k*, the proper diff. of latitude 1060 3.0253059
So is the ſec. of the ang. *l b k*, the courſe 27d. 22m. — — } 10.0515465

To *b l*, the direct diſtance — 1193,6 — 3.0768524

Caſe II. One latitude, courſe, and diſtance ſailed being given, to find the other latitude and difference of longitude.

Example. A ſhip in the latitude of 40d. oom. north, longitude 20d. weſt, ſails ſouth 51d. 10m. weſterly, 1020 miles; required the latitude ſhe is in, and her difference of longitude?

1. As radius — 90d. oom. — 10.0000000
To the diſtance ſailed — 1020 — 3.0086002
So is the co-ſine of the courſe — 51d. 10m. — 9.7973071

To the proper difference of latitude 640 — 2.8059073
Hence the ſhip will be in the latitude of 29d. 20m. north; whence the meridional difference will be=780.3.
Then it will be,
As radius — 90d. oom. — 10.0000000
To the meridional diff. of latitude 780,3 2.8922616
So is the tangent of the courſe 51d. 10m. 10.0942155

To the difference of longitude — 970 — 2.9864771

Caſe III. Both latitudes and courſe being given to find the diſtance ſailed, and difference of longitude.

Example. A ſhip, in the latitude 40d. 00m. north, ſails ſouth 51d. 10m. weſterly, till ſhe be found by obſervation to be in the latitude of 29d. 20m. north; required the direct diſtance ſailed and difference of longitude?

As radius —— 90d. 00m. — 10.0000000
To the proper difference of latitude 640 — 2.8059073
So is the ſecant of the courſe — 51d. 20m. — 10.2026929

To the direct diſtance —— 1020 — 30.086002
Then, having found the meridional difference of latitude =780,3, it will be,
As radius —— 90d. 00m. — 10.0000000
To the meridional diff. of latitude 780.3 2.8922616
So is the tangent of the courſe 51d. 10m. 10.0942155

To the difference of longitude — 970 — 2.9864771

Caſe IV. Both latitudes and diſtance ſailed being given, to find the courſe ſteered and difference of longitude.

Example. A ſhip, in the latitude of 40d. 00m. north, ſails between the ſouth and weſt 1020 miles, and is then found by obſervation to be in the latitude of 29d. 20m. north, required the courſe ſteered, and difference of longitude?

As the diſtance ſailed —— 1020 — 3.0086002
Is to radius — — 90d. 00m. — 10.0000000
So is the proper difference of latitude 640 2.8059073

To the co-ſine of the courſe — 51d. 10m. — 9.7973071
Whence the meridional difference of latitude will be =780,3, and the difference of longitude found by the following proportion:
As radius — — 90d. 00m. — 10.0000000
To the merid. diff. of latitude — 780,3 — 2.8922616
So is the tangent of the courſe 51d. 10m. 10.0942155

To the difference of longitude — 970 — 2.9864771

Caſe V. One latitude, courſe, and difference of longitude being given, to find the other latitude and diſtance ſailed.

Example. Suppoſe a ſhip, in the latitude of 40d. 00m. north, ſails ſouth 51d. 10m. weſterly, until her difference of longitude be 970 miles; required the diſtance ſailed, and what latitude ſhe is in?

As the tangent of the courſe — 51d. 10m. 10.0942155
To the difference of longitude — 970 — 2.9864771
So is radius —— —— 90d. 00m. 10.0000000

To the meridional difference of lat. 780,3 2.8922616
And, becauſe the ſhip is ſailing towards the equator, therefore,
From the meridional parts of the lat. ſailed from 40d. 00m. —— —— } 2622.7
Take the meridional difference of latitude 780.3

Remain the meridional parts of the latitude arrived in 29d. 20m. —— —— 1842.4
Whence the proper difference of latitude will be 640.
Then, to find the diſtance ſailed, it will be,
As radius —— —— 90d. 00m. 10.0000000
To the proper difference of latitude 640 2.8059073
So is the ſecant of the courſe 51d. 10m. 10.2026989

To the diſtance ſailed —— 1020 3.0086062
And becauſe the ſhip is ſailing towards the equator, and, conſequently, decreaſing the latitude; therefore,

	d. m.
From the latitude ſailed from —	40 : 00 north.
Take the difference of latitude — 640 =	10 : 40
Remains the latitude ſhe is in ——	29 : 20 north.

Caſe VI. One latitude, courſe, and departure being given, to find the other latitude, diſtance, and difference of longitude.

Example. Suppoſe a ſhip in the latitude 40d. 00m, north, longitude 20d. 00m. weſt, ſails ſouth 51d. 10m. weſterly, till ſhe have departed from her former meridian 794,6 miles: required the diſtance ſailed, difference of longitude, and what latitude ſhe is in?

1. As the ſine of the courſe 51d. 10m. 9.8915226
To the departure —— —— 94,6 2.9001486
So is radius —— 90d. 00m. 10.0000000

To the diſtance —— 1020 3.0086260
2. As the tangent of the courſe 51d. 10m. 10.0942155
To the departure —— 794,6 2.9001486
So is radius —— 90d. 00m. 10.0000000

To the proper difference of lat. — 640 — 2.8059331
And, as the ſhip is conſtantly decreaſing her latitude, therefore the difference of latitude, being taken from the latitude ſailed from, will give 29d. 20m. north, the latitude the ſhip is in: whence the meridional difference of latitude will be — — 780.3
Then, to find the difference of longitude, it will be,
As radius —— 90d. 00m. 10.0000000
To the meridional diff. of lat. — 780,3 2.8922616
So is the tangent of the courſe — 51d. 10m. — 10.0942155

To the diff. of long. —— 970 — 2.9864771

Caſe VII. The departure and both latitudes being given, to find the courſe, diſtance, and difference of longitude.

Example. Suppoſe a ſhip in the latitude of 40d. 00m. north, 20d. 00m. weſt longitude, ſails between the ſouth and weſt till ſhe be found by obſervation to be in the latitude of 29d. 20m. north, and to have departed from her former meridian 794,6 miles; the courſe ſteered, diſtance ſailed, and difference of longitude, are required?

1. As the proper difference of lat. — 640 — 2.8059073
To radius —— 90d. 00m. — 10.0000000
So is the departure — 794,6 — 2.9001486

To the tangent of the courſe — 51d. 10m. — 10.0942413
2. As the ſine of the courſe 51d. 10m. — 9.8915226
To the departure —— 794,6 — 2.9001486
So is radius —— 90d. 00m. — 10.0000000

To the diſtance —— 1020 — 3.0086260
Then, having found the meridional difference of latitude, the difference of longitude will be found by the following proportion:
As radius —— 90d. 00m. — 10.0000000
To the merid. diff. of latitude — 780.3 — 2.8922616
So is the tangent of the courſe 51d. 10m. — 10.0942155

To the difference of longitude — 970 — 2.9864771
Or it may be found by the log. tangents, thus,
As the tang. of the log. rumb. 51d. 30m. 19ſ. 10.1015093
To the log. of the remainder — 985,825 — 2.9937899
So is the tang. of the courſe — 51d. 10m. — 10.0942155

To the difference of longitude — 970 — 2,9864961

Caſe VIII. One latitude, diſtance ſailed, and departure being given, to find the other latitude, courſe, and difference of longitude.

Example. A ſhip in the latitude of 40d. 00m. north, longitude 20d. 00m. weſt, ſails between the ſouth and weſt 1020 miles, and is found to have departed from her former meridian 794,6 miles, required the courſe ſteered, difference of longitude, and what latitude ſhe is in?

1. As the diſtance —— 1020 —— 3.0086002
To radius — 90d. 00m. —— 10.0000000
So is the departure — 794.6 —— 2.9001486

To the ſine of the courſe 51d. 10m. — 9.8915484
2. As radius —— 90d. 00m 10.0000000
To the diſtance —— 1020 — 3.0086002
So is the co-ſine of the courſe — 51d. 10m. 9.7973071

To the proper difference of lat. — 640 — 2.8059073
Hence it appears, that the ſhip's true courſe is ſouth 51d. 10m. weſterly, or nearly ſouth-weſt half weſterly, and that ſhe is in the latitude of 29d. 20m. north; whence the meridional difference of latitude is 780,3; and to find the difference of longitude, it will be,
As radius —— 90d. 00m. — 10.0000000
To the merid. difference of latitude — 780,3 2.8922616
So is the tang. of the courſe — 51d. 10m. — 10.0942155

To the difference of longitude — 970 — 2.9864771

Middle Latitude Sailing, a method of performing the problems of ſailing by the help of the middle latitude, which nearly agrees with Mercator.

Current Sailing, See Current.

 Parallel

Parallel SAILING, the method of finding the diftance run, when a fhip fails under a parallel, or on a direct eaft or weft courfe. Under the article DEGREE, we have fhewn the method of finding the length of a degree of longitude in any latitude, and given a table for that purpofe; by the help of which, all the propofitions relating to parallel failing may be eafily folved.

SAINT, in the Romifh church, a holy perfon deceafed, and fince his deceafe canonized by the Pope, after feveral informations and ceremonies.

SAINTFOIN, or SAINFOIN, the name given by the French, and continued by us to a fpecies of plant frequently ufed for the food of cattle, either frefh or dried; it is called holy hay, or wholefome hay, from its excellent nutritive quality. The ftalks of the plant are commonly about two feet long, but they grow fometimes to five or fix feet, and it has tufts of red flowers of three, four, or five inches in length.

This plant will make forty times greater increafe in poor ground than the common turf; and this is owing to its having a long perpendicular root, of that kind called tap-roots, which finks to a great depth to attract its nourifhment. The length of this root is fcarce to be credited by any but thofe who have feen it; it is frequently drawn out of the ground to the length of twelve or fourteen feet, but it is faid to be often thirty feet or more in length.

The farmers have a general opinion, that this plant never fucceeds well in any land where there is not an under ftratum of ftone, or chalk, or fome other hard matter, to ftop its running; but that otherwife it fpends itfelf in root, and comes to nothing above ground. This is an error too grofs to need much refutation. It is certain, that the roots being to plants what the ftomach and guts are to animals, the more and larger roots any plant has, the more nourifhment it receives, and the better it thrives.

Saintfoin always fucceed, where its roots run deep, and the beft crops of all are produced upon lands where there is no hard under-foil to obftruct their paffage. An under foil of clay may kill the plants, by retaining the water, and chilling and rotting their roots.

The long root of faintfoin has, near the furface, many horizontal roots iffuing from it, which extend themfelves every way: there are of the fame kind all the way down, as the roots go, but they grow fhorter and fhorter all the way. Any dry land may be made to produce this valuable and ufeful plant, though it be ever fo poor, but the richeft and beft land will produce the beft crops of it. The beft way of fowing it is by drilling, but the earth muft be very well prepared, and the feed well ordered, or elfe very little of it will grow. The heads of thefe feeds are fo large, and their necks fo weak, that, if they be much more than half an inch deep, they are not able to rife through the incumbent mould; and if they are not covered, they will be malted, as the farmers exprefs it; that is, it will fend out its root while it lies above-ground, and be killed by the air; and whether the farmer plants bad feed that will not grow, or good feed that is buried or malted, the event will be the fame. The ground will be underftocked with plants. A bufhel of feed to an acre of land is full twenty feeds to each fquare foot of land; but, as there is fome difference in the largenefs of the feeds, there is no abfolute certainty as to this calculation. The worft feafons for planting it are the beginning of winter, and the drought of fummer; the beft is the beginning of the fpring; and it is always ftrongeft when planted alone, and is not fown together with corn, as is the practice of fome farmers. If barley, oats, or any other corn, fown with the faintfoin, happen to be lodged afterwards, it kills the young faintfoin. If it be planted with any other corn, it is beft done with drilling in the horfe-hoeing way; in this cafe it is not much liable to be killed by the lodging of the corn, as the drilled corn feldom falls at all, and, when it does, never falls fo low as the fown corn.

SAKER, a fmall fort of cannon, of which there are three fpecies, extraordinary, ordinary, and middle fized.

SALAMANDER, *Salamandra*, in zoology, a name given by authors to feveral fpecies of the lizard kind; but the principal are two, the falamandra aquatica, the water-newt, and the falamandra terreftris.

The falamandra aquatica is the two-edged-tail-lizard, with four toes on the anterior, and five on the hinder feet. It grows to about four inches in length, and to the thicknefs of a man's finger: the back is of a deep fhining brown; the belly of a bright and gloffy yellow.

The falamandra terreftris, or land falamander, is a fpecies of lizard, the tail of which is fhort, and its colour of a fine black, marked with red fpots of a bright and fhining gloffy appearance.

SALAMANDER'S-BLOOD, among chymifts, denotes the rednefs remaining in the receiver after diftilling the fpirits of nitre.

SALARY, *Salarium*, a recompence made to a perfon for his pains or induftry about another perfon's bufinefs, as in the cafe of officers, &c.

SALE, in general, fignifies the transferring the property of goods from one to another, upon fome valuable confideration, as when in a bargain one agrees to give another a certain fum of money for fuch goods, and thereupon gives the feller earneft, which he accepts; this is a perfect fale, and fhall bind the buyer and feller.

SALEP, in the materia medica, the root of a fpecies of orchis.

Salep fhould be chofen clean, firm and hard; it is very little liable either to decay or fophiftication. The people of the E. Indies look upon falep to be one of the greateft reftoratives and provocatives to venery in the whole vegetable world. The falep differs very little from the common orchis in virtue. Its appearance is owing to the manner of preparing it, and confequently this may be done from the roots of orchis of our own growth. To prepare thefe in imitation of falep, Mr. Geoffroy chofe the largeft, faireft, and plumpeft roots he could find: thefe he nicely fkinned; then throwing them into cold water he fuffered them to macerate there for fome time; after this he lightly boiled them, and then taking them out of the water and draining them, he had them ftrung upon threads to be dried in a warm dry air; when the roots were thoroughly dried they were very tranfparent, and refembled pieces of tragacanth, and continued dry and hard. The roots thus prepared may be reduced to powder, which will diffolve away in boiling water, and a fcruple of it will make a bafon full of jelly, in the manner of the Turkifh falep. This jelly is an admirable medicine in all cafes in which falep is prefcribed; and the powder may be given with great fuccefs in affes-milk for difeafes of the breaft. The falep which we receive from Turky is always a tranfparent root, of a whitifh or redifh colour, according to its different age, and is chiefly recommended in confumptions, bilious dyfenteries and diforders of the breaft proceeding from an acrimony of the juices.

SALIANT, in fortification, denotes projecting. There are two kinds of angles, the one faliant, which are thofe that prefent their points outwards; the other re-entering, which have their points inwards.

SALIENT, SALIANT, or SAILLANT, in heraldry, is applied to a lion, or other beaft, when its fore-legs are raifed in a leaping pofture.

SALIVA, *Spittle*, a thin pellucid humour, feparated from the arterial blood, by the glands about the mouth and fauces, and conveyed, by proper faliva ducts, into the mouth for feveral ufes.

It confifts of a great deal of water or phlegm, and a volatile falt, and fome add a fulphureous fpirit; and is void both of tafte and fmell: its ufes are very great; it moiftens the throat, preferves it from the injuries of the air, and facilitates fpeech. Being mixed with aliment, it renders fwallowing eafy, and affifts digeftion by its aqueous, faline, and other parts. Some imagine it to do the office of a menftruum, by mixing the oily and aqueous parts of the food more intimately, diffolving the faline parts, and procuring a fermentation in the ftomach: but Dr. Drake is of opinion, that were the faliva acrimonious enough for this purpofe, it muft greatly offend the ftomach, efpecially confidering the quantities of it that many fwallow, even upon an empty ftomach. In hungry perfons, fays Boerhaave, it is fluid, acrid, and copioufly difcharged; and in thofe who have fafted long, it is highly acrid, penetrating, and refolvent. In farinaceous and fucculent vegetables, it not only produces a fermentation, but alfo augments one already begun. It is fwallowed not only by brutes, but by human creatures, in a found ftate, even when afleep. Too copious an evacuation

evacuation of it, made voluntarily, produces loſs of appetite, bad digeſtion, and an atrophy. By manducation thereof the ſaliva is expreſſed and accurately mixed with the attenuated food; which contributes, firſt, to the aſſimilation of the aliments to the nature of the body to be nouriſhed: ſecondly, to the due mixture of the oleous to the aqueous parts: thirdly, to the ſolution of the ſaline parts: fourthly, to fermentation: fifthly, to a change of the taſte and ſmell of the aliments: ſixthly, to an augmentation of the inteſtine motion: ſeventhly, to a momentaneous relief from hunger; and, eighthly, an application of the ſapid parts, though inſipid itſelf.

SALIVAL, or SALIVARY *Ducts*, in anatomy, certain ſmall lymphatick canals, whereby the ſaliva flows from the ſalival glands into the mouth.

SALIVATION, in medicine, a promoting of the flux of ſaliva, by means of medicines, moſtly by mercury. The chief uſe of ſalivation is in diſeaſes belonging to the glands, and the membrana adipoſa, and principally in the cure of the venereal diſeaſe, though it is ſometimes alſo uſed in epidemick diſeaſes, cutaneous diſeaſes, &c. whoſe criſes tend that way. See POX, &c.

A ſalivation is excited, according to Boerhaave, 1. By waſhing the mouth with certain liquors. 2. By the ſlow and protracted maſtication of ſome viſcid matter, ſuch as maſtich, wax, and myrrh, eſpecially if acrid ſubſtances are mixed with theſe, ſuch as pellitory of Spain, pyrethrum, ginger, and pepper. 3. By drawing into the mouth acrid and irritating vapours, ſuch as thoſe of tobacco, ſage, roſemary, marjoram, thyme, and mother of thyme. 4. A ſalivation is excellently excited by the action of ſuch medicines as produce a gentle but long continued nauſea, ſuch as antimony neither entirely fixed nor totally emetick, taken with a ſmall quantity of common vitriol. By ſuch ſubſtances as totally diſſolve all the parts of the blood, convert it into lymph, and render it fit for a diſcharge by way of ſaliva; ſuch as crude quickſilver, cinnabar, a ſolution of quickſilver in aqua fortis, white precipitate, red precipitate, turbith mineral, and ſublimate mercury diſſolved: the action of thoſe medicines is promoted by warm fomentations applied to the head, neck, and face. An exceſſive ſalivation is leſſened or ſtopped, 1. By a large and continual uſe of mild and tepid drinks, ſuch as decoctions of mallows and liquorice in milk and water. 2. By allaying the impetus of the humours, by means of mild, oleous, and anodine emulſions, with a proper addition of diacodium or opium. And, 3. By making a revulſion of the humours to other parts, eſpecially that by ſtool. But great caution is neceſſary, leſt the impetus of the moved matter, which in this caſe is always acrid, ſhould ruſh to other parts, and produce a greater danger.

SALIX, the willow, in botany. See WILLOW.

SALLET, or SALLAD, a diſh of eatable herbs, ordinarily accompanying roaſt meat, compoſed chiefly of crude freſh herbage, ſeaſoned with ſalt, oil, and vinegar: ſome add muſtard, hard eggs, and ſugar; others pepper; and others ſpices, with orange-peel, ſaffron, &c. The principal ſallet-herbs, and thoſe which ordinarily make the baſis of our ſallets, are lettice, celeri, endive, creſſes, raddiſh and rape; to which are ſometimes added purſlane, ſpinach, ſorrel, tarragon, burnet, corn-ſallet, and chervil.

SALLY, in architecture, is what we more uſually call projecture. See PROJECTURE.

SALLY, in the military art, the iſſuing out of the beſieged from their town or fort; and falling upon the beſiegers in their works, hinder the progreſs of their approaches, and deſtroy their works, &c.

SALMO, SALMON, in ichthyology, a well known fiſh. It is diſtinguiſhed from other fiſh of the truttaceous kind by theſe characters; it is of an oblong body covered with very ſmall ſcales, a ſmall head, a ſharp noſe, and a forked tail. Its back is bluiſh; the reſt of its body whitiſh, or rediſh, and uſually ſpotted. Its under jaw is bent upwards, and that ſometimes ſo much as to make itſelf a ſinus in the upper, by conſtant motion, and ſometimes to perforate it. The ſalmon is firſt produced from its parent's ſpawn in freſh rivers, thence it goes into the ſea to acquire its growth and feed, and, at the time of its full growth, and in the ſeaſon for ſpawning, it removes into the freſh waters again.

SALON, or SALOON, in architecture, a very lofty ſpacious hall, vaulted at top, and ſometimes comprehending two ſtories or ranges of windows. The ſalon is a grand room in the middle of a building, or at the head of a gallery, &c. Its faces or ſides ought all to have a ſymmetry with each other; and as it uſually takes up the height of two ſtories, its cieling, as Daviler obſerves, ſhould be with a more moderate ſweep. Salons are frequently built ſquare, and ſometimes octogonal.

SALT, *Sal*, in natural hiſtory, the name of a ſeries or ſubdiviſion of foſſils, naturally and eſſentially ſimple, not inflammable, and ſoluble in water.

Sea SALT, *and that of* SALT *Springs*. Though there are immenſe quantities of foſſile ſalt diſperſed throughout the ſeveral parts of the world, the foſſile is however, of its two ſtates, that in which it is found by much the leaſt abundantly. The waters of the ſea, and thoſe of ſalt ſprings, contain an infinitely larger quantity of it in ſolution, than any the moſt extravagant computation can ſuppoſe there to be of it ſolid. The ſalt is perfectly the ſame in the ſea water and in that of theſe ſprings. But it is mixed with various other things in both, and is to be ſeparated from them by chryſtallization. The ſea water, beſide ſpar, often contains bituminous matter of various kinds in it, and that of ſalt ſprings, though it be more free from this admixture, yet holds a vaſt quantity of a foul and earthly ſpar, the ſame with that of the ſea water, which is ſeparated from them both in boiling, but in much greater quantity, even in proportion to that of the ſalt from the brine of ſprings than of ſea water.

The water of the ſea contains, in different parts of the world, very different quantities of ſalt. But that of the ſalt ſprings is always much more ſalted with it, than the ſtrongeſt of the ſea-water: in ſome places it is found loaded with nearly as much as it could be made to contain, ſome ſprings yielding a brine that affords near a quarter of a pound of ſalt, from the pound weight of this liquor, and many of them being ſo ſtrongly impregnated, that the workmen are obliged to let them down or lower them, by mixing them with a large quantity of ſea or common water, before they are fit to be boiled in the ſalt; the common run of ſea water does not hold ſo much as a one-fourth part of this quantity, ſome not one-eighth of it.

The ſalt produced from the ſea water of all the parts of the world, and from the brine of all the ſprings of the world, is abſolutely the ſame; but differs in ſtrength, and ſome other qualities, according to the operation by which it is made. In general, the quicker the liquor is evaporated, the weaker is the ſalt; the more time is employed in the proceſs, the ſtronger. This is not wonderful, when we conſider, that, over a gentle heat, water alone, or almoſt alone, evaporates from the liquor, but, over a more violent fire, a part of the ſtrength or acid of the ſalt is raiſed with it.

It is upon this principle, and owing to this cauſe, that we find the ſalt of our ſalt ſprings, which is uſually ſold us under the name of baſket ſalt, the weakeſt of all. It is not that there is any difference in the waters from which theſe ſeveral kinds of ſalt are produced, that they appear to us in different degrees of ſtrength, but that the people who work the brine pits, make the ſalt with leſs expence of the workman's time: that the ſea ſalt is formed over a ſomewhat ſlower fire, and that the bay ſalt is made only by the ſun's heat, where the proceſs is very long, and the heat very moderate, and the ſalt is found ſtrong in proportion.

This is ſo indiſputable a truth, that once every week, a very ſtrong ſalt, little inferior to bay ſalt in that quality, is made at the brine pit works, where the common run of the ſalt is the weakeſt in the world. The liquor is the ſame in this caſe, but the workmen who do not work on Sundays, leave a pan full to evaporate ſlowly over the fire, which they prepare on the Saturday night, and the moderate heat and length of time under which the weekly parcel of ſalt is made, render it very different from the common ſalt of the works, both in form and qualities: it is found to be made up of large and hard grains, inſtead of the ſmall and ſoft ones of the common kind, and is vaſtly ſuperior to it in ſtrength. This circumſtance overlooked by the workmen, and even by their maſters too, for many years, gave the hint to Mr. Lownds, and afterwards to the very ingenious Dr. Browning, author of an excellent treatiſe on this ſubject, to propoſe to the government a method of making

a ſtrong ſalt fit for all the purpoſes for which we buy it of our neighbours, only by a new, that is, a ſlower way of working our own brines. The latter of theſe gentlemen has proved, inconteſtably, that we may, if we will encourage proper manufactures, have common ſalt of every kind made at home, equal in ſtrength, and equally fit for all purpoſes, with the ſalt of any part of the world. After theſe accounts of the muria of common ſalt under its different forms, and as expreſſed by different names, it remains to treat of its qualities and virtues in general.

It reſolves ſpontaneouſly in the air, but this in different times according to the dampneſs or dryneſs of that element, and according to its own laxer or firmer ſtructure. The coarſer ſalts diſſolve ſooner than the finer, and there are even ſome pieces of ſal gemmæ ſo firm, that they are ſcarce to be at all affected, even on their ſurface, by the moiſteſt common air.

Common ſalt, added to aqua fortis, enables it to diſſolve gold, making it into what is called aqua regia; by diſtillation it yields a ſtrong and acid ſpirit; it is the moſt, of all ſubſtances, endued with keeping animal bodies from putrefaction, and it alſo preſerves vegetables in the ſame manner as long digeſtions. In medicine, it is a common ingredient in clyſters, and ſerves to ſoften and bring away indurated fæces. Suppoſitories are alſo made of a mixture of it with honey, and are put up the fundament, to promote a tendency to defuctions. Aloes and colocynth are ſometimes added on theſe occaſions, when there is required more power in the medicine. In apoplectick caſes, it is generally an ingredient among the ſtimulating things adminiſtered in clyſters, only it is neceſſary to have this caution, that if there appear reaſon to ſuſpect an inflammation of the inteſtines, or but a tendency to it, every thing of this kind is to be avoided.

Common ſalt that has not been expoſed to the fire, makes no change into the colour of ſyrup of violets; it does not make any effervеſcence with oil of tartar, nor does it make lime water turbid, but added to ſpirit of ſal armoniack, it manifeſts ſome ſigns of a latent acidity, by rendering it cloudy: on the contrary alſo, it manifeſts ſomething of an alkaline nature, by rendering a ſolution of mercury whitiſh; and it raiſes an effervеſcence with oil of vitriol, attended with heat. On ſolution in water, common ſalt manifeſts alſo two very different principles after evaporation. When reduced to a proper conſiſtence, that is, when the quantity of water is not more than as three to one to that of the ſalt, a part of it concretes into grains of ſalt of the ordinary kind; but there remains yet in the liquor, after all that can be ſeparated this way has been procured, a ſtrong taſte of a ſaline nature: the ſalt that gives it this, will never be brought to cryſtallize, but muſt be ſeparated by evaporating all the liquor away; it is then found to be of an alkaline nature, aſſuming no regular form in its cryſtals, and eaſily imbibing the humidity of the air, and running into a liquor with it.

The baſis of ſea ſalt, therefore, is a mineral alkali, which is ſo intimately blended with its peculiar acid, that the latter has ſcarce any power of exerting itſelf. The acid, drawn by diſtillation from ſea ſalt, turns the ſyrup of violets red, and ferments vehemently, though without heat, with oil of tartar, but it does not heat on being poured into lime water. This ſpirit is the only one that can be properly called a ſolvent for gold and for tin, but ſilver and lead reſiſt it. The acids of nitre and vitriol, alſo, obtain the ſame qualities on being mixed with it, and become aquæ regales. If this acid be perfectly ſaturated with ſalt of tartar, cryſtals of the form and quantities of thoſe of common ſalt may be obtained from the mixture; theſe cryſtals are called regenerated ſea ſalt, and ſerve to prove what we obſerved above, that an alkali is the baſis of ſea ſalt, and that more alkalis than one may ſerve to that purpoſe with the peculiar acid, which is the eſſential part of this ſalt.

Phyſicians are of opinion, that ſalt has the ſame effects in the human body that it has out of it, in checking fermentation, and preventing putrefaction; they therefore eſteem it of good uſe mixed with the generality of our foods in the ſtomach: they are of opinion alſo, that it carries its effect into the blood, and has the qualities of a moderate dryer, detergent and attenuant, added to thoſe of a ſtimulant, which common reaſon declares it to be. Hence may be deduced all the virtues attributed to ſalt, as an aperient, ſtomachick, or warming medicine, and a provocative to venery; but in what degree it poſſeſſes all theſe qualities, we are, by its univerſal uſe in foods, prevented from being able to determine. Van Helmont recommends it as a good preſervative againſt the ſtone and gravel: he has been ſeverely cenſured for this by others, who are of opinion, that all ſalted foods, ſuch as ſalt beef, and the like, are very bad in thoſe caſes: but both parties may be in the right: there is a great deal of difference between common ſalt eaten with the freſh juices of our food, and the brine and pickle into which it runs in the time of its being left upon the meat preſerved by it. Salt is very properly put into the mouths of people in apoplectick fits, as it not only irritates but attenuates the juices there, and promotes a diſcharge of them; and in a palſy which affects the tongue, a ſage leaf, bruiſed and covered with ſalt, has long been a famous remedy among the good women, and not without reaſon.

Mixed with bran, and heated in a canvas bag, it is recommended to be applied externally to the head in head-achs, ariſing from a moiſt cauſe, and in defluxions: and we find the old phyſicians very ſtrenuouſly recommending a cataplaſm made of the ſame ingredients for pains.

SALT-*Mines*. The moſt remarkable ſalt-mines, are thoſe of Bochna and Viliſke, not far from Cracow in Poland; and thoſe at Soowar, near Eper, in Upper Hungary. The ſalt-mines near the ſmall town of Viliſke, which (the church excepted) is altogether dug hollow under ground, have four deſcents; of which the two principal, being in the town itſelf, are thoſe through which the ſalt is drawn up; the other two ſerve for letting down timber and other neceſſaries. Theſe deſcents or holes are four or five feet ſquare, lined all the way downwards with timber. Above is a great wheel with a ſtrong rope of the thickneſs of a luſty arm, drawn about by a horſe like as in a horſe-mill. He that will deſcend muſt cover himſelf with a frock, and have another man that faſtens another rope to the aforeſaid big rope, and, having ſo tied it about himſelf as to ſit in it, he takes him in his lap, and holds him faſt about; whereupon the big rope being ſomewhat let down, another faſtens likewiſe a piece of rope to the other thick rope, and does like the former, ſeating himſelf in it, and taking and claſping another man in his lap, and, being alſo let down a little way, gives place to others to do the like, in which manner 30, 40, and more perſons may be let down all at once; of whom the firſt, having touched the ground, ſteps out and goes aſide, the reſt following him, and doing the like, and thus they deſcend to the depth of 100 fathoms. But then they take a lamp and lead people about by ſtrange paſſages and meanders, ſtill more and more deſcending till they come to certain ladders by which they go down 100 fathoms deeper, where there are double paſſages and holes one above another in abundance; for the mine-men dig on ſtill, and cut out every where, and on all ſides, as the ſalt-mine laſts. The great holes to ſecure both the town above, and work below from falling in, are carefully ſupported by ſtrong and well compacted timber.

Theſe mines were firſt diſcovered in 1251. Within them is found a kind of ſubterraneous republick, which has its polity, laws, and families, and even publick roads, carriages and horſes for drawing the ſalt to the mouth of the quarry where it is taken up by engines. Theſe horſes, when once down, never ſee the light again; but the men take frequent occaſions to breathe the village air. When a traveller is arrived at the bottom of this ſtrange abyſs where ſo many people are interred alive, and where ſo many are even born, and have never ſtirred out, he is ſurpriſed with a long ſeries of lofty vaults ſuſtained by huge pilaſters cut with the chiſſel, and which, being themſelves rock-ſalt, appear, by the light of flambeaux, which are inceſſantly burning, as ſo many cryſtals or precious ſtones of various colours ſhedding a luſtre almoſt intolerable to the eye.

The rocks of ſalt are hewn in the form of huge cylinders, the workmen uſing hammers, pick-axes, and chiſſels, much as in our ſtone quarries, to ſeparate the ſeveral banks of ſtone. As ſoon as the maſſive pieces are got out of the quarry, they break them into fragments fit to be thrown into the mill, where they are ground and

and reduced to a coarse farina or flour, which serves all the uses of sea-salt. In these mines there are three kinds of sal gemmæ; one is common, coarse, and black, the second somewhat finer and whiter; the third very white, hard, and transparent, which last is the sal gemmæ of the druggists and dyers. It cuts like crystal, and is frequently used for toys, chaplets, little vases, and the like; the other sorts are less compact, and only fit for kitchen uses. The coarse and black salt is cut out in great pieces, roundish, and three Polonian ells long, and one ell thick, which are sold from 50 to 70 Polonian florins. The greatest pieces lie before their doors, where they are licked by the cattle, as they pass; the colour of these salt stones is darkish grey, with some mixture of yellow. But the principal wonder of the place is, that through these mountains of salt, and along the middle of the mine, there runs a rivulet of fresh water sufficient to supply the inhabitants.

The imperial salt-mines at Soowar, near Eper, in Upper Hungary, are remarkable for many curious particulars; of which Dr. Bruckman gives us the following account: They are at least 100 fathoms deep. In the cuts of them are sometimes found alleys of rock-salt, of the most delicate blue and yellow colours. He observed, that the first colour exposed to the sun for some days lost entirely that beautiful ultra-marine, and became white as the other rock-salt, which did not happen to the yellow, which preserved its colour; but, when pounded together, the salt was neither blue nor yellow, but extremely white.

Melissantes, in his geography, speaking of salt-works which the Spaniards have in Catalonia, says that there is rock-salt, the colour of which is so diversified, that it comes near the rainbow in having green, red, yellow, and blue colours; but that by first preparing, and then grinding it, it becomes white. The same happens to the red rock-salt of Saltzburg, which being pounded, becomes white. But one thing very remarkable in the mines of Soowar is a chapel, which can easily contain 100 people, cut in the rock-salt, with an altar, a pulpit, sacristry, and forms cut in the same rock. They celebrate once every year, the week after Epiphany, divine service in this chapel, and the sermon is always preached by a Jesuit of Eper. This chapel was founded for the officers of the excise and the miners. But that which is most curious in these subterraneous fosses, are the flowers of salt, which grow like the beard of a goat, with this difference only, that these are much whiter and finer. One cannot enough admire these efflorescences which seem to vegetate, yet one cannot find them in all the cuts, nor at all times, but they appear and grow according to the temperature of the seasons, which in these parts is very wholesome. These sorts of plumes of salt are very brittle; they melt also in moist places, and dissolve into an oil, but are nevertheless a most pure salt, the finest, the most acid, the whitest, and most beautiful; so that it is not without reason they have given it the name of flower of salt.

At Neusol there is a statue of rock-salt as large as the life, which serves as the barometer of the town; for, when it begins to sweat or grow moist, it presages rain or wet weather; but, when it is dry, you may certainly promise yourself settled fair. There are also several salt-mines in England about the wyches in Cheshire.

Properties of common SALT. Common salt has many very extraordinary properties. 1. The smallest crystals of common salt are always of a cubick figure, that is, the figure of a dye. 2. Upon the application of fire to it, it crackles. This decrepitation or crackling of salt seems to proceed from the air contained in its pores, which, being rarified by the fire, breaks its prison, and makes its escape. 3. Spirit of salt is the only thing in nature that will dissolve gold, but not without being joined with the spirit of nitre. 4. Salt preserves all vegetable and animal substances from putrefaction, as also water, and is itself incorruptible; this property it entirely owes to the acid it contains. A greater quantity of common salt will be dissolved in a given quantity of water than of any other salt whatever; for six ounces of common salt may be dissolved in 16 of water; but it must be observed, that warm water will dissolve more salt than cold, and that in proportion to the heat of the water. Thus water, in that degree of heat which makes it boil, dissolves more salt than in any less degree of heat, insomuch that, as it grows cool, it will every moment let fall more and more of the salt which was dissolved in it, which will appear at the bottom of the containing vessel undissolved, and, when the water is so cold as to freeze, it will expel almost all the salt, which will stick to the bottom of the ice in a solid form.

Salt, dissolved in water of a heat equal to that of the atmosphere, renders the water considerably colder, and yet, notwithstanding this increase of coldness, the salt will keep the water from freezing, insomuch that water wherein salt is dissolved shall not freeze near so soon as pure water: and hence we may observe that salt, when interposed between the small particles of water, has the power of preventing this association, that is, their concretion into ice; otherwise salt, by increasing cold, would promote freezing.

If spirit of salt is poured upon ice reduced to powder, it will increase the coldness thereof to a surprising degree; to a degree much greater than ever was produced naturally, and in which every animal must die.

Salt thrown upon burning coals greatly increases their heat. This proceeds from the air, water, and acid contained in the body of the salt; for the air being forced out of the salt by heat, acts upon the fuel like a pair of bellows; and that water will increase the heat of fire, is known to all smiths, who, when they would make their fires intensely hot, frequently sprinkle water upon the burning coals.

Salt, made extremely dry, attracts the moisture of the air considerably even in the driest seasons, insomuch that it is a common thing for people who deal in salt, to buy it at the wyches very dry, and to sell it again many miles distant for less per 100 than it cost them; yet are they considerable gainers, because the same quantity of salt that weighs 100 at the wyches, will be much heavier, after having imbibed the moisture of the air.

With respect to these properties of salt, it may be remarked that, as putrefaction is always in proportion to heat, that vast body of water which we call the sea, would putrefy and stink (as we find, in effect, fresh and stagnating waters do) especially in hot climates and calm weather. Now, this putrefaction would be fatal, not only to all the animals contained in the sea, but also to those land animals that come within the influence of the vapours arising from this vast body of putrefying waters, which probably would be all animals upon the face of the earth.

Now, we find by the fourth property of salt, that it preserves all vegetable and animal substances from putrefaction, as also water; and that there is a great quantity of this salt in the sea, is a proposition unnecessary to be proved.

By property the fifth we find that a greater quantity of salt will be dissolved in warm water than cold; and by this it should seem that more salt should be dissolved in hot climates, and in hot weather, where there is more occasion for it to guard it against putrefaction, than in cold climates, and in cold weather, where there is less occasion for it; accordingly we find by repeated experience, that in the Mediterranean sea, where the climate is hot, one pint of water contains one ounce of salt; but, in the Baltick, where the climate is cold, the same quantity of water contains only half an ounce. It is as certain that under the equator the sea water contains still a greater proportion of salt, and those seas that lie more northward than the Baltick, a less.

Agreeable to this is an observation made by a friend of Mr. Boyle, at his desire, who found, by a glass instrument made on purpose, that the sea-water increased in weight, and consequently in saltness, the nearer he approached the line. The same author further informs us, that at Munar, near the great Cape of Comori, where the famous pearl-fishing is carried on, and the climate is very warm, the ocean is so salt as to deposit a good quantity at the bottom in hard lumps. We learn further from property the sixth, that salt renders water, wherein it is dissolved, colder than it would otherwise be. Now, as putrefaction is in proportion to heat, this property must also guard against putrefaction in hot climates, and in hot seasons.

Dr. Halley, in the Philosophical Transactions, has a dissertation to shew, that as salt is perpetually conveyed

to the ſea by rivers, the ſea muſt daily acquire a greater degree of ſaltneſs, inſomuch that, if we had any authentick obſervations relative to the degree of ſaltneſs of the ſea made at diſtant periods of time, we might from theſe calculate the age of the world.

But if there is any truth in theſe obſervations, with reſpect to the ſaltneſs of the ſea, as there undoubtedly is, Dr. Halley's ſyſtem, however pretty and ingenious, muſt entirely fall to the ground; as the reader will eaſily perceive, if he conſiders that the ſea was, in all probability, as ſalt a fortnight after the fall of Adam, as at this time, ſince the neceſſity and convenience of it were as great then as now: and it is very unlikely, that the Almighty ſhould create his works imperfect, and leave them to be brought to perfection by a long ſeries of time.

SALTIER, in heraldry, an ordinary in form of a St. Andrew's croſs; which may be ſaid to be compoſed of a bend dexter and ſiniſter, croſſing each other in the centre of the eſcutcheon.

SALT PETRE, the ſame with nitre. See NITRE.

SALVAGE MONEY, a reward allowed by the civil and ſtatute law, for the ſaving of ſhips or goods from the danger of the ſeas, pirates, or enemies.

Where any ſhip is in danger of being ſtranded, or driven on ſhore, juſtices of the peace are to command the conſtables to aſſemble as many perſons as are neceſſary to preſerve it; and, on its being preſerved by their means, the perſons aſſiſting therein ſhall, in 30 days after, be paid a reaſonable reward for the ſalvage, otherwiſe the ſhip or goods ſhall remain in the cuſtody of the officers of the cuſtoms, as a ſecurity for the ſame.

SALVATELLA, in anatomy, a branch of the auxillary vein, which runs over the back of the hand towards the little finger.

SALUTATION, the act of ſaluting, greeting, or paying reſpect and reverence to any one.

There is a great variety in the forms of ſalutation. The Orientals ſalute by uncovering their feet, laying their hands on their breaſts, &c. In England, we ſalute by uncovering the head, bending the body, &c. The pope makes no reverence to any mortal, except the emperor, to whom he ſtoops a very little, when he permits him to kiſs his lips. A prince, or perſon of extraordinary quality, is ſaluted at his entering a garriſon by the firing of the cannon round the place. In the field, when a regiment is to be reviewed by a king, or general, the drums beat as he approaches, and the officers ſalute him one after another as he paſſes by, ſtepping back with the right foot and hand, bowing their ſpontoons to the ground, and then recovering them gently, bringing up the foot and hand, planting them; which done, they pull off their hats without bowing. The enſigns ſalute all together, bringing down their colours near the ground directly before them at one motion, and having taken them up again, gently lift their hats.

At ſea, they ſalute by a diſcharge of cannon, which is greater or leſs, according to the degree of reſpect they would ſhew; and here ſhips always ſalute with an odd number of guns, and galleys with an even one. To ſalute with muſkets is to fire one, two, or three volleys; which is a method of ſalutation that ſometimes precedes that of cannon, and is uſed on occaſion of feaſts. After the cannon, they alſo ſometimes ſalute or hail with the voice, by a joint ſhout of all the ſhip's company, repeated three times; which ſalutation alſo occaſionally obtains where they carry no guns, or do not care to diſcharge any. Saluting with the flag is performed two ways, either by holding it cloſe to the ſtaff, ſo as it cannot flutter, or by ſtriking it ſo as it cannot be ſeen at all, which is the moſt reſpectful. Saluting with the ſails is performed by hovering the top-ſails half way of the maſts. Only thoſe veſſels that carry no guns ſalute with the ſails.

SAMARITANS, an ancient ſect among the Jews, ſtill ſubſiſting in ſome parts of the Levant, under the ſame name. Its origin was in the time of Rehoboam, under whoſe reign the people of Iſrael were divided into two diſtinct kingdoms, that of Judah and that of Iſrael; the capital of the latter being Samaria, the Iſraelites obtained the name of Samaritans; though Dr. Gill is of opinion, for which he gives good reaſons, that the Samaritans are really the deſcendants of the Babylonians, Cuthites, &c. ſent to Samaria by the king of Aſſyria, on the removal of the tribes of Iſrael into captivity; ſee his diſſert. on the Hebrew language, &c. chap. 3.

They were anciently guilty of idolatry, and the Rabbins pretend, that they worſhipped the figure of a dove on mount Gerizzim; but the preſent Samaritans, who are but few in number, are far from being idolaters. They celebrate the paſſover every year, on the 14th day of the firſt month, on mount Gerizzim, and begin that feaſt with the ſacrifice appointed for that purpoſe in Exodus: they keep the ſabbath with all the rigour with which it is enjoined in the book of Exodus, none among them ſtirring out of doors but to the ſynagogue; they ſacrifice no where but on mount Gerizzim: they obſerve the feaſts of expiation, tabernacles, harveſt, &c. and never defer circumciſion beyond the 8th day; they never marry their nieces as the Jews do; have but one wife; and, in fine, do nothing but what is commanded in the law.

SAMARITAN *Medals*, ſome ancient medals in the cabinets of our antiquaries, the inſcriptions and legends of which are in Hebrew; but the character different from the Hebrew of our Bibles, which is the ſquare Hebrew, or Chaldee; from this character, and not from their being ſtruck by the Samaritans, they are denominated Samaritan.

SAMBUCUS, the Elder, in botany, a genus of plants, the flower of which conſiſts of a ſingle rotated ſemiquinquifid petal; its fruit is a roundiſh unilocular berry, containing three ſeeds, convex on one ſide, and angulated on the other.

The inner green bark of this ſhrub is gently cathartick: an infuſion of it in wine, or its expreſſed juice, in the doſe of half an ounce, or an ounce, is ſaid to purge moderately; and in ſmall doſes, to prove an efficacious deobſtruent, capable of promoting all the fluid ſecretions. The young buds, or rudiments of the leaves, are ſtrongly purgative, but are reckoned unſafe. The expreſſed juice, ſpiſſated to the conſiſtence of a rob, proves an uſeful aperient medicine, which is good in obſtructions of the viſcera, and promotes the natural evacuations.

SAMBUCUS is alſo an ancient muſical inſtrument of the wind-kind, reſembling a flute; probably thus called, becauſe made of elder.

SAMIAN EARTH, in the materia medica, the name of two ſpecies of marl uſed in medicine, viz. 1. The white kind, called by the antients, collyrium ſamium; being aſtringent, and therefore good in diarrhæs, dyſenteries, and hæmorrhages; they alſo uſed it externally in inflammations of all kinds. 2. The browniſh-white kind, called after ſamius, by Dioſcorides: this alſo ſtands recommended as an aſtringent.

SAN-BENITO, or *Soco Benito*, a kind of linen garment worn as a badge by perſons who have been condemned by the inquiſition. It is in form of a ſcapular, being a broad piece of cloth hanging down before and behind, with two St. Andrew's croſſes on it; it is of a yellow colour, and painted over with devils and flames.

SANCTUARY, among the Jews, alſo called Sanctum Sanctorum, or Holy of Holies, was the holieſt and moſt retired part of the temple of Jeruſalem, in which the ark of the covenant was preſerved, and into which none but the high prieſt was allowed to enter, and that only once a year, to intercede for the people. Some diſtinguiſh the ſanctum ſanctorum from the ſanctuary, and maintain that the whole temple was called the ſanctuary. To try and examine any thing by the weight of the ſanctuary, is to examine it by a juſt and equal ſcale: becauſe, among the Jews, it was the cuſtom of the prieſts to keep ſtone weights, to ſerve as ſtandards for regulating all weights by, though theſe were not at all different from the royal, or profane weights.

Sanctuary, in the Romiſh church, is alſo uſed for that part of the church in which the altar is placed, incompaſſed with a rail or balluſtrade.

SANCTUARY, in our ancient cuſtoms, is the ſame with aſylum. See ASYLUM.

SAND, *Arena*, in natural hiſtory; a genus of foſſils, the characters of which are, that they are found in minute concretions; forming together a kind of powder, the genuine particles of which are all of a tendency to one determinate ſhape, and appear regular, though more or leſs complete concretions; not to be diſſolved or diſunited by water, or formed into a coherent maſs by means of it, but retaining their figure in it; tranſparent,

vitrifiable

vitrifiable by extreme heat, and not diffoluble in, nor effervefcing with, acids. Sands are fubject to be varioufly blended both with homogene and heterogene fubftances, as that of talcks, &c. and hence, as well as from their various colours, are fubdivided into, 1. White fands, whether pure or mixed with other arenaceous or heterogeneous particles; of all which there are feveral fpecies, differing no lefs in the finenefs of their particles, than in the different degrees of colour, from a bright and fhining white, to a brownifh, yellowifh, greenifh, &c. white. 2. The red and redifh fands, both pure and impure. 3. The yellow fands, whether pure or mixed, are alfo very numerous. 4. The brown fands, diftinguifhed in the fame manner. 5. The black fands, whereof there are only two fpecies, viz. a fine fhining greyifh black fand, and another of a fine fhining redifh-black colour. 6. The green kind, of which there is only one known fpecies, viz. a coarfe variegated dufky green fand, common in Virginia.

Sand is of great ufe in the glafs-manufacture; the white writing fand being employed for making of the white glafs, and a coarfe greenifh-looking fand for the green glafs.

In agriculture, it feems to be the office of fand to make unctuous earth fertile, and fit to fupport vegetables, &c. For earth alone, we find, is liable to coalefce, and gather into a hard coherent mafs, as appears in clay; and being thus embodied, and as it were glued together, is no way difpofed to nourifh vegetables.

Sand-Flood, a terrible mifchief, incident to the lands of Suffolk, and fome other parts of England; which are frequently covered with vaft quantities of fand, rolling in upon them like a deluge of water, from fandy hills in their neighbourhood. The beft way of ftopping its progrefs is, by hedges of furze, planted one over another as they become level.

Sand-Lands, or Sandy Lands, in agriculture, are made up of fands of different colours and qualities; as white, blackifh, redifh, or yellowifh; and in the form of their particles, fome being milder or harfher, and others very light, feeming mere duft. The grey, black, and afh-coloured fands are the worft of all, and are generally found on heaths and commons.

The moft fuitable plants for arable lands of this kind are white oats, rye, black wheat, and turneps: the natural produce in weeds, is quick-grafs, forrel, broom, furze, fern, and heath. The beft manure for them is either marl or fuch clay as will break with the frofts. Cow-dung is alfo faid to be good for fuch lands; and many ufe with fuccefs chalk, mud, and the half rotten ftraw of dunghills.

SANDAL, in antiquity, a rich kind of flipper, worn on the feet by the Greek and Roman ladies, made of gold, filk, or other precious ftuff, confifting of a fole, with an hollow at one extreme to embrace the ancle, but leaving the upper part of the foot bare.

SANDARACH, in natural hiftory, a very beautiful native foffil, though too often confounded with the common factitious red arfenick, and with the red matter formed by melting the common yellow orpiment.

It is a pure fubftance, of a very even and regular ftructure, is throughout of that colour which our dyers term an orange-fcarlet, and is confiderably tranfparent even in the thickeft pieces. But though with refpect to colour, it has the advantage of cinnabar while in the mafs, it is vaftly inferior to it when both are reduced to powders. It is moderately hard, and remarkably heavy, and when expofed to a moderate heat, melts and flows like oil: if fet on fire, it burns very brifkly.

It is found in Saxony and Bohemia, in the copper and filver mines, and is fold to the painters, who find it a very fine and valuable red: but its virtues or qualities in medicine, are no more afcertained at this time, than thofe of the yellow orpiment.

Gum-Sandarach, is a dry and hard refin, ufually met with in loofe granules, of the bignefs of a pea, a horfe-bean, or larger; of a pale whitifh yellow, tranfparent, and of a refinous fmell, brittle, very inflammable, of an acrid and aromatick tafte, and diffufing a very pleafant fmell when burning. It is produced from a fpecies of the juniper, and the cedrus baccifera. It flows only from thefe trees in hot countries; but the natives promote its difcharge by making incifions in the bark. What is obtained from the cedar is more fragrant, efpecially when burnt; but it is feldom to be met with feparate in the fhops, both being mixed together under the common name of fandarach. Sandarach is good in diarrhœas, and in hæmorrhages; where its dofe is from 10 grains to half a drachm: it is alfo fometimes prefcribed in gonorrhæas, and the fluor albus; but at prefent it is much difufed in medicine. It is, however, much ufed by our writing-mafters, who make a powder of it which they call pounce.

The varnifh-makers make a kind of varnifh of it by diffolving it in oil of turpentine, or linfeed, or in fpirit of wine.

SANDIVER, a whitifh falt, continually caft from the metal, as it is called, whereof glafs is made; and fwimming on its furface, is fkimmed off. Sandiver is alfo plentifully thrown out in the eruptions of vulcanos; fome is of a fine white, and others tinged blueifh, or yellowifh. Sandiver is detergent, and good for foulneffes of the fkin. It is alfo ufed by gilders of iron.

SANDIX, a kind of minium, or red-lead, made of cerufe; but much inferior to the true minium. See Minium and Ceruse.

SANGUIFICATION, in the animal œconomy, the converfion of chyle into true blood.

SANHEDRIM, or Sanhedrin, among the Jews, the great council of the nation, confifting of 70 fenators, taken partly from among the priefts and Levites, and partly out of the inferior judges, who formed what is called the leffer fanhedrim. The room they met in, was a rotunda, half of which was built without the temple, and half within. The nafi, or prefident of the fanhedrim, fat upon a throne, with his deputy on his right hand, his fub-deputy on his left, and the other fenators ranged in order on each fide.

The authority of this council was very extenfive, for they decided fuch caufes as were brought before them by way of appeal from the inferior courts; and the king, the high priefts, and prophets, were under the jurifdiction of this tribunal. They had the right of judging in capital cafes, and fentence of death might not be pronounced in any other place; for which reafon the Jews were forced to quit this hall, when the power of life and death was taken out of their hands, 40 years before the deftruction of the temple, and three years before the death of Chrift.

There were feveral inferior fanhedrims in Paleftine, each of which confifted of 23 perfons; all thefe depended on the great fanhedrim of Jerufalem.

SANIES, in medicine, a ferous putrid matter, iffuing from wounds; it differs from pus, which is thicker and whiter.

SANTALUM, Saunders, in the materia medica, a hard odoriferous medicinal wood, brought from the E. Indies, of which there are three forts, viz. the yellow, white, and red; the yellow or citrine faunders, is a beautiful wood; of the colour of lemon-peel; of a fmell fomewhat like a mixture of mufk and rofes, and of a fomewhat acrid and aromatick tafte, with a flight bitternefs. The white faunders refembles the yellow, and is of the fame fragrant fmell and aromatick tafte, but in a more remifs degree. Both thefe forts fhould be chofen found, firm, heavy, and of a good fmell when cut; they fhould alfo be chofen in the block, and not cut into chips as they ufually are, for in this manner they foon lofe much of their virtue. The red faunders is of a denfe and compact texture, remarkably heavy and very hard. It is brought to us in logs of confiderable length, the out part of which is of a dufky, and the inner of a blood red; it has but little fmell, and is of an auftere tafte.

All thefe forts are attenuants, and all have an aftringency, but the red moft of all. They are accounted cordials, and are faid to be good in obftructions of the vifcera; but they are little ufed, except as ingredients in fome of the compofitions of the fhops.

SANTOLINA, Female Southern-Wood, or *Lavender-Cotton*, a plant, the compound flower of which is uniform, confifting of a number of infundibuliform hermaphrodite corollulæ, quinquifid at the limb; which are each followed by a fingle feed, contained in the cup. The medicinal virtues afcribed to fantolina, are, in general, the fame with thofe of the abrotanum mas, or male fouthern-wood: it is however particularly recommended in uterine complaints; and its feed is good for deftroying worms. See Southern-Wood.

SAP, in physiology, a juice furnished by the earth, and changed into the plant, consisting of fossil parts, other parts derived from the air and rain, and others from putrified animals, plants, &c. See JUICE.

SAP, or *Sapp*, in the art of war, is the digging deep under the earth of the glacis, in order to open a covered passage into the moat. It is only a deep trench, covered at top with boards, hurdles, earth, sand-bags, &c. and is usually begun five or six fathoms from the saliant angle of the glacis.

SAPINDUS, the SOAPBERRY-TREE, in botany, a plant, the flower of which consists of four oval petals; and the fruit of three capsules, each including a globose nut. The berries of this tree are used for washing, instead of soap, whence the English name.

SAPO, SOAP. See SOAP.

SAPONARIA, SOAPWORT, in botany, a plant, the flower of which consists of five petals, with a plane limb; and its fruit an unilocular capsule, containing a number of small seeds. The root of this plant is accounted aperient, corroborant, and sudorifick; and even preferred by some to sassafras in these intentions. The leaves, agitated with water, raise a saponaceous froth, which has nearly the same effects with solutions of soap itself, in taking out spots from cloths, whence the name.

SAPPHIRE, a pellucid gem, which, in its finest state, is extremely beautiful and valuable, and second only to the diamond in lustre, hardness, and price. Its proper colour is a pure blue; in the finest specimens it is of the deepest azure, and in others varies into paleness in shades of all degrees between that and a pure crystal brightness and water, without the least tinge of colour, but with a lustre much superior to the crystal. They are distinguished into four sorts, viz. the blue sapphire, the white sapphire, the water sapphire, and the milk sapphire.

The gem known to us by this name is extremely different from the sapphire of the ancients, which was only a semi-opake stone, of a deep blue veined with white, and spotted with small gold-coloured spangles, in the form of stars, and was only a more beautiful kind of the lapis lazuli: but our sapphire they have described under the name of beryllus aeroides, or the sky-blue beryl.

The finest sapphires in the world are brought from the kingdom of Pegu, in the E. Indies, where some are found perfectly colourless, and others of all the shades of blue; these are all found in the pebble-form. We have very fine sapphires also, partly pebble, partly crystal-shaped, from Bisnagar, Conanor, Calicut, and the island of Ceylon: these also are of all the shades of blue. And in Ceylon there are sometimes found a sort of bastard gems, of a mixed nature between the sapphire and ruby. The occidental are from Silesia, Bohemia, and many other parts of Europe; but though these are often very beautiful stones, they are greatly inferior, both in lustre and hardness, to the oriental.

The sapphire is said to have very great virtues as a cordial, sudorifick, and alexipharmick; but we have no good testimony of any body's having ever found this by experiment.

SARABAND, a musical composition in triple time, being in reality only a minuet, whose motions are slow and serious.

SARCASM, in rhetorick, a bitter, keen irony, whereby the orator scoffs and insults his adversary.

SARCOCELE, in medicine, a hard, fleshy, scirrhous excrescence, rising up by little and little about the testicles, or in the inner membrane of the scrotum. Some writers call it hernia carnosa.

SARCOCOLLA, a gum resin, brought to us in small granules of an irregular figure. It is brought to us from Persia and Arabia, but we are wholly unacquainted with the plant that produces it; no author, either ancient or modern, having given us any information about it. Some authors recommend Sarcocolla to be taken internally as a balsamick; but Hoffman, from experience, absolutely condemns the internal use of it. It is recommended for opthalmies and defluxions of a sharp matter on the eyes, and is generally ordered to be dissolved in milk for this purpose.

SARCOLOGY, a discourse on the flesh, or soft parts of the human body.

SARCOMA, in surgery, a fleshy tumour, arising, in any part of the body, from some effusion of the nutritive juices out of their tubuli, as happens in contusions, or by other accidents.

SARCOMPHALON, or SARCOMPHALUM, in surgery, a fleshy excrescence at the navel.

SARCOPHAGUS, in medicine, a name for the assius lapis. Carthereticks, or medicines which consume the flesh, are also thus called.

SARCOPHAGUS, among the ancients, implied a tomb, composed of a kind of stone, found near Assum, a city of Troas, which had the faculty of consuming the body in a very short time. In these tombs they deposited those they had not a mind to burn.

SARCOTICKS, medicines which generate flesh in wounds.

SARDION, or SARDIAN *Stone*, a precious stone, generally called a cornelian. See CORNELIAN.

SARDONYX, a precious stone of an appearance between the sarda and the onyx.

SARPLAR *of Wool*, a half sack, generally called a pocket.

SARRASIN, or SARRAZIN, in fortification, a kind of portcullice, otherwise called an herse, which is hung with ropes over the gate of a town or fortress, and let fall in case of a surprise.

SARSAPARILLA, the root of a plant growing in Peru and Brazil. The plant which produces it, is one of the diœcia hexandria of Linnæus, and of the herbæ bacciferæ of Mr. Ray; and is described by late botanists under the name of smilax aspera Peruviana; and by Herrandez under that of mecapati sive zarcaprilla.

It is a sudorifick, and an attenuant, and has been esteemed a great medicine in the cure of the venereal disease, but the use of mercury has caused it of late to be neglected. It is however of great service in many chronick cases, which owe their origin to obstructions of the viscera, and where attenuants are proper; but it must be continued a long time, and is best given in decoction, or by way of diet drink.

SARTORIUS, in anatomy, a muscle called also longus tibiæ, which ariseth from the inferior part of the spine of the ilium, and, running obliquely by the inside of the thigh, is inserted into the internal side of the tibia, three or four fingers breadth below its upper extremity. By this muscle we throw one leg across the other: it is an antagonist to the poplitæus.

SASSAFRAS, a very light and spongy wood, of a pale whitish red colour, with an admixture of brown in it, and of a very fragrant and perfumed smell, and of an acrid and aromatick sweet taste, which is very agreeable. The tree which produces the sassafras, is one of the enneandria monogynia of Linnæus, and one of the abores fructu calyculato of Mr. Ray. It is described by all the late botanical writers, under the name of sassafras arbour, and sassafras ficulneo folio. It grows in several parts of America, from whence the sassafras is brought to us.

Sassafras wood is a diuretick and diaphoretick; it attenuates viscid humours, and is good in all obstructions of the viscera. It is given in cachexies, in scorbutick complaints, and in the venereal disease. It is seldom given in substance; the usual way of taking it being in infusion, in the manner of common tea, in which method it is very pleasant. The oil extracted from it is very fragrant, and possesses most of the virtues of the wood.

SATELLITE, a guard or person that attends on another, either for his safety, or to be ready to execute his pleasure.

SATELLITES, in astronomy, certain secondary planets, moving round some other planets as a centre, as the moon does round the earth; so called, because they always attend them in their revolutions round the sun.

SATELLITES *of Jupiter*. See JUPITER.

SATELLITES *of Saturn*. See SATURN.

SATRAPA, or SATRAPES, in antiquity, a governor of a province among the ancient Persians.

SATURDAY, the sixth day of the week; so called from Seater, an old idol of the Saxons, worshipped on this day.

SATURN, in astronomy, one of the primary planets, being the farthest distant from the sun, characterized thus, ♄. This planet has five satellites, or moons, moving round him, and is besides encompassed with a surprizing ring. We have given a perspective view of this planet with his ring, (*plate* LXXII. *fig.* 3.)

Galileo's

Galileo's telefcope was fufficient to difcover all Jupiter's moons, but it would not reach Saturn's, they being at too great a diftance. But yet this fagacious obferver found Saturn, by reafon of his ring, had a very odd appearance; for his glafs was not good enough to exhbit the true fhape of the ring, but only a confufed idea of that and Saturn together, which, in the year 1610, he advertifed in the letters of this fentence tranfpofed: "Altiffimum planetam tergeminum obfervavi;" i. e. I have obferved Saturn to have three bodies.

This odd phænomenon perplexed the aftronomers very much, and various hypothefes were formed to folve it; all which feemed trifling to the happy Huygenius, who applied himfelf purpofely to improve the grinding of glaffes, and perfecting long telefcopes to arrive at a more accurate notion of this planet and its appendage. Accordingly, in 1655, he conftructed a telefcope of 12 feet, and viewing Saturn divers times, he difcovered fomething like a ring encompaffing his body; which, afterwards, with a tube of 23 feet, he obferved more diftinctly, and alfo difcovered a fatellite revolving about the planet. This Huygenian fatellite is the fourth in order from Saturn.

In the year 1656, Huygens publifhed his difcovery in relation to Saturn's ring, in the letters of this fentence tranfpofed, 'Annulo cingitur tenui plano, nufquam 'cohærente, ad eclipticam inclinato;' that is, Saturn is encompaffed by a thin plane ring, no where cohering to his body, and inclined to the plane of the ecliptick. This inclination of the ring to the ecliptick is determined to be about 31° by Huygens, Romer, Pickard, Campani, &c. though by a method not very definitive.

However, fince the plane of the ring is inclined to the plane of the earth's motion, it is evident, when Saturn is fo fituated that the plane of his ring paffeth through the earth, we can then fee nothing of it; nor can we fee it when the plane paffes between the fun and the earth, the dark fide being then turned to us, and only a dark lift appearing upon the planet, which is probably the fhadow of the ring. In other fituations the ring will appear elliptical, more or lefs; when it is moft fo, the heavens appear through the elliptick fpace on each fide Saturn (which are called the anfæ) and a fixed ftar was once obferved by Dr. Clarke's father in one of them. The nodes of the ring are in 19° 45′ of ♍ and ♓. During Saturn's heliocentrick motion from 19° 45′ to the oppofite node, the fun enlightens the northern plane of the ring.

Since Saturn defcribes about 1° in a month, the ring will be vifible through a good telefcope till within about 15 or 20 days before and after the planet is in 19° 45′ of ♍ or ♓. The time, therefore, may be found by an ephemeris, in which Saturn feen from the earth fhall be in thofe points of the ecliptick; and, likewife, when he will be feen from the earth in 19° 45′ of ♊ and ♐, when the ring will be moft open, and in the beft pofition to be viewed. There have been fome grounds to conjecture that Saturn's ring turns round an axis, but that is not yet demonftrable. This wonderful ring, in fome fituations, does alfo appear double; for Caffini, in 1675, obferved it to be diffected quite round by a dark elliptical line, dividing it, as it were, in two rings, of which the inner one appeared brighter than the other. This was oftentimes obferved afterwards, with tubes of 34 and 20 feet, and more evidently in the twilight or moon-light, than in a darker fky.

If an eye were placed in Saturn, the diameter of the fun would appear 10 times lefs than it doth to us almoft; and, confequently, his difk, light, and heat will be there 90 times lefs. Saturn's year is almoft 30 of ours, but the length of his day is yet uncertain, becaufe the time of his revolution round his axis is not yet known; but Mr. Huygens judges they are not longer than the days of Jupiter. That great aftronomer fuppofeth the axis of Saturn to be perpendicular to the plane of his ring, and of the orbits of the fatellites: if fo, then there will be the fame pofition of the equator and pole as to the fixed ftars, as there is in our earth: the fame pole ftar and the fixed ftars will appear to rife and fet after the fame manner, in the fame latitudes. There is a vaft inequality in the length of the day in feveral parts of this planet; and as great a diverfity of fummer and winter; which depends on the quantity of the inclination of the plane of the equator to the plane of the orbit of Saturn round the fun; which Huygens makes to be 31°, which is almoft one third more than in our earth, where yet the differences and variety of feafons and weather are very fenfible. For in Saturn, in the latitude of 50°, the longeft day will have no night at all, and the longeft night will have no day. And the two frigid zones will be each of them 60° broad, at leaft, ten times as large as the whole furface of the earth. The eye thus placed will be able to difcern none of the planets but Jupiter, which will appear always to accompany the fun, and never to be from him above 37°. The parallax of the fun in Saturn is but 9″, and therefore infenfible; but the parallaxes of all his moons or fatellites are very confiderable, and therefore their diftances from him will be eafily computable.

But what an eye placed in Saturn would moft admire, is the ring of that planet; the only thing of that nature that is difcovered in any of the planets. Kepler, in his Epitome Aftron. Copernic. and after him Dr. Halley in his enquiry into the caufes of variation of the needle, Philof. Tranfact. numb. 195, fuppofe our earth may be compofed of feveral crufts or fhells one within another, and concentrick to each other. And if fo, then it is poffible the ring of Saturn may be the fragment or remaining ruins of his formerly exterior fhell, the reft of which is broken or fallen down upon the body of the planet. And if Saturn ever had fuch a fhell round it, its diameter would then have appeared as big to an eye at the fun, as that of Jupiter doth now, when feen from thence.

Since the outward margin of the ring is diftant from Saturn $2\frac{1}{4}$ of Saturn's femi-diameter, this cannot be feen at the diftance of 64° from Saturn's equator, in whofe plane the ring is placed. Therefore, a fpectator, placed in a latitude higher than that, can never fee the ring at all; fo that there is a zone of almoft 23° broad towards either pole, to whom this famous ring can never appear. And as the fpectator fhall move nearer the pole, firft one, then the fecond fatellite, next the third and fourth; and when he is come within 1° of the pole, even the fifth fatellite cannot be feen, unlefs by refraction; and, in the winter time, neither fun, moon, nor any other planet, will be there vifible, unlefs perhaps, a comet.

If the eye be fuppofed to be placed in the equator of Saturn, or in the zone nearly adjoining, it can never fee thofe ftars that are in or very near the equator, nor any one of the fatellites; becaufe the ring will always hide them; and then at the equinoxes it cannot fee the fun; and if it were any where elfe placed, it could not then fee the ring; becaufe neither of its faces will then appear illuminated by the fun. The breadth of this ring it is hard to determine from our earth, becaufe its thicknefs is fo fmall; but Mr. Huygens makes it to be about 600 German miles.

For one half of Saturn's year (viz. 15 years of ours) only one face of the ring will be enlightened by the fun: whence the inhabitants, which may be fuppofed to live in that hemifphere, to which this face of the ring is turned, or to whom it is fummer, will fee that part of the ring which is above their horizon, fhining faintly by day, as our moon doth when the fun is above our horizon, but brighter and ftronger by night, as our moon doth in the fun's abfence: and after fun-fet, the eaftern part of this enlightened arch will fall within the fhadow of Saturn; which fhade will afcend, as night comes on, and at midnight will be at the higheft; and then will defcend again towards the weftern part of the ring, according as the fun comes more and more to the eaftward. This enlightened arch will always fhew how to defcribe a meridian line; for a plane perpendicular to the horizon, and paffing through the vertex of the arch, will be in the true meridian.

To an eye placed any where without, and at lefs than 50° diftance from the equator, this enlightened arch of the ring will appear concave as well as convex, like a kind of furnace or vault, rifing above the horizon: but to an eye more than 52′, and lefs than 64° diftant from the equator, the hollow or concave part will not be vifible; but there will appear a brightifh body arifing, as it were, out of the ground, and contiguous to the horizon. For the other half of Saturn's year, while the fun declines

declines towards the depressed pole, or during the 15 years winter, the ring will not be visible, as having not that face illuminated which is turned to the spectator's eye: but, however, will render itself sensible, by covering from the sight such stars and parts of the heavens as are opposite to it, or apparently behind it. The shade of the ring, also, will be extended more and more towards the nearer pole: so that to an eye placed any where within the aforesaid space, the sun, when he attains such a certain declination, will appear to be covered or eclipsed just at noon, and then straight to emerge out of the shadow. The next day, the like phænomenon will happen, but the eclipse will begin sooner, and will be over later: and these meridian eclipses will daily increase in their duration, until the middle of winter; and then they will decrease again gradually, till at last they will come to nothing again; viz. when the sun, returning from the tropick, hath the same declination as he had when these meridional eclipses began.

And this will happen, if an eye be placed in any latitude greater than 25 or 26°; but if in a latitude less than this, when the meridian darkness is of the greatest duration, the sun will suddenly appear just in the meridian, and then straightway will be eclipsed again. The next day there will appear the like sort of light, but it will last longer; and this meridian light will grow still longer and longer in duration, till mid-winter, and then, like the darkness above-mentioned, it will be continually decreasing, until it quite disappear. And from hence it is plain, that there is the greatest difference between summer and winter in the globe of Saturn, of all the other planets; and this both on the account of the long duration of each, and the great declination of the sun from the equator; and, also, by reason of these meridional darknesses in the winter, arising from the ring's eclipsing the sun. *Greg. Astron.*

Satellites of SATURN. Anno 1684, in the month of March, Mr. Cassini, by the help of excellent object-glasses of 70, 90, 100, 136, 155, and of 220 feet, discovered the two innermost (that is, the 1st and 2d) satellites of Saturn.

The first Satellite he observed never to be distant from Saturn's ring above two-thirds of the apparent length of the same ring: and it was found to make one revolution about Saturn in 1 day, 21 hours, and 19 minutes, making two conjunctions with Saturn in less than 2 days; one in the upper part of his orb, and the other in the lower part; it is distant from the centre of Saturn $4\frac{3}{8}$ of Saturn's semi-diameters.

The second Satellite of Saturn was observed but three-fourths of the length, and his ring distant therefrom, making his revolution about him in 2 days, 17 hours, 43 minutes. This is distant from the centre of Saturn $5\frac{1}{7}$ semi-diameters of that planet. From a great number of accurate observations, he concluded that the proportion of the digression of the second to that of the first, counting both from the centre of Saturn, is as 22 to 17. And the time wherein the second satellite makes its revolution, is to the time wherein the first makes its, as $24\frac{1}{4}$ to 17.

The third is distant from Saturn 8 of his semi-diameters, and revolves round him in almost $4\frac{1}{2}$ days.

The fourth, or Huygenian satellite, as it is called, because discovered first by Mr. Huygens, revolves about Saturn in about 16 days, and is distant from his centre about 18 semi-diameters of Saturn.

The fifth satellite of Saturn is distant from his centre 54 semi-diameters of Saturn, and revolves round him in $79\frac{1}{3}$ days. The great distance between this satellite and this precedent, made Mr. Huygens suspect there might be a sixth between these two; or else that this fifth may have other satellites moving round him.

Dr. Halley in Philos. Trans. gives a correction of the theory of the motion of the Huygenian, or fourth satellite of Saturn, and makes the true time of its period to be 15 days, 22 hours, 41′, 6″; its diurnal motion to be 22°, 34′, 38″, 18‴. And the distance of this satellite from the centre of Saturn to be about 4 diameters of the ring; that is to say, intersecting the orb of Saturn with an angle 23° and a half, so as to be nearly parallel to the earth's equator. The periodical times of the satellites of Saturn, according to Mr. Cassini, are as follows:

	Days.	Hours.	Min.
First ——— ———	1	21	19
Second ——— ———	2	17	43
Third ——— ———	4	12	27
Fourth ——— ———	15	23	15
Fifth ——— ———	79	22	00

Dr. Gregory, in his excellent astronomy, hath demonstrated, that if a satellite describe an ecliptick orbit round a planet placed in one of the foci of that ellipsis, the greater axis of the line of the apses will, with an angular motion, twice advance forwards, viz. in the two syzygies, and twice recede backwards, viz. when in quadrature to the sun. And that this force of progression is near twice as great as that of the recess, and, therefore, the line of the apses, in every revolution of the satellite, will advance more forward than it will recede backward; and that by the excess of this progression, the apses will move in consequentia. If a satellite move round a planet in an eccentrick orbit, the eccentricity will be twice changed in every revolution, and in each revolution will be greatest, when the satellite is in the syzygies with the sun, and least, when it is in the quadratures; and will be continually increasing from the quadratures to the syzygies, and decreasing from the syzygies to the quadratures.

If a satellite revolve round a planet in an orbit whose plane is inclined to the plane of the orbit of the planet round the sun, then will the line of the nodes move in antecedentia, with an unequal angular motion; swiftest when the nodes are in quadrature to the sun, after this slower, and at last, when the nodes are in the syzygies, will be quite at rest. In the intermediate places between the quadratures and syzygies, the nodes will recede slower, and in every revolution of the satellite, will either be retrograde or stationary, be carried backward, or move in antecedentia, and in each revolution will recede fastest, all things considered, when the satellite is in the syzygies.

The inclination also of the plane of the orbit of the satellite, to that of the planet, will be continually changing, and will be greatest when the nodes are in the syzygies with the sun, and least, cæteris paribus, when they are in the quadratures. And all the inequalities in the motions of the satellites will be a little greater when they are in conjunction with the sun, than when they are in opposition to him.

SATURN, in chymistry, the same with lead. See LEAD.

SATURN, in heraldry, the black colour in the arms of sovereign princes.

SATURNALIA, a festival of the ancient Romans, observed on the 17th of December, in honour of the god Saturn.

SATURNINE, or SATURNIAN, a term applied to persons of dark, sullen, melancholy complexions, as being supposed under the predominancy of Saturn.

SATYR, or SATIRE, a discourse or poem exposing the vices and follies of mankind. The different derivations of this word have affected its orthography, some writing it Satyr, and others Satire.

The Grecian satire differed from the Roman; but the difference seems not so great as some are apt to imagine: the former was of the dramatick kind, a sort of interlude annexed to tragedy, to remove from the audience too melancholy impressions.

The word satyr was anciently taken in a less restrained sense than it is at present, not only as denoting a severe poem against vice, but as consisting of precepts of virtue, and the praises of it: and even in the Satyrs, as they are called, of Horace, Juvenal, and Persius, &c. which are principally levelled against the weakness, the follies, or vices of mankind, we find many directions, as well as incitements to virtue. Such strokes of morality Horace is full of; and in Juvenal they occur very frequently. All of them, sometimes, correct vice like moralists; we may say, like divines rather than satyrists. With respect to the nature and different species of it, satyr, in general, being a poem designed to reprove the vices and follies of mankind, is two-fold; either the jocose, as that of Horace, or the serious, like that of Juvenal: the former hidden, the latter open. That generally makes sport with vice, and exposes it to ridicule: this probes it to the bottom, and puts it to the torture: and so far is it from not deserving the title of satire, as some pretend, that it seems rather

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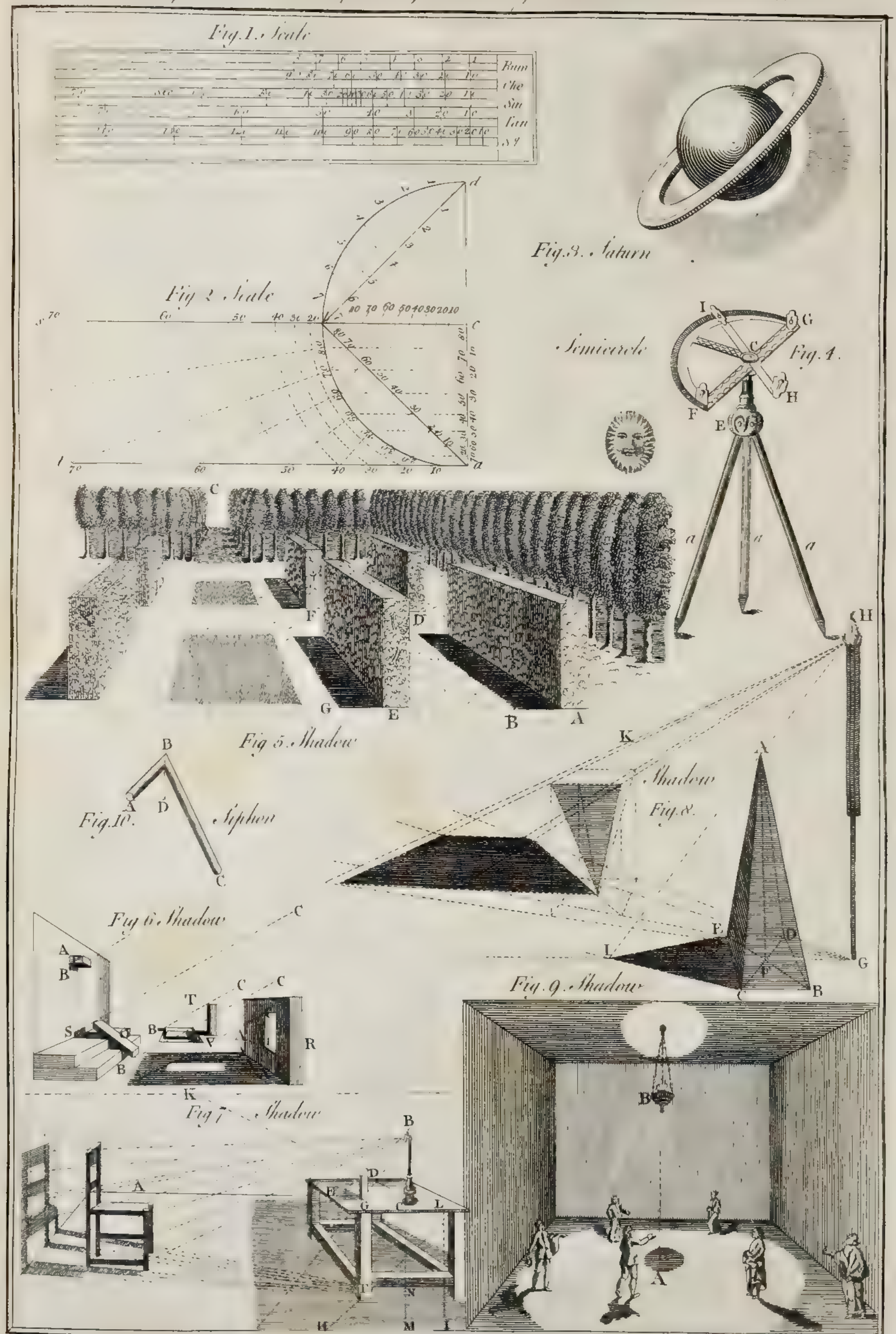

Plate LXXII

facing Scales.

rather a more noble ſpecies of it; and the genteel ſtrokes of Horace, how ingenious ſoever, are leſs affecting than the poetick rage and commendable zeal of Juvenal.

They both agree in being pungent and cutting, yet are diſtinguiſhed by very evident marks. The one is pleaſant and facetious, the other angry and auſtere: the one ſmiles, the other ſtorms: the foibles of mankind are the object of one; greater crimes of the other: the former is always in the pleaſing ſtile; the latter generally in the ſublime: that abounds with wit only; this adds to the ſalt bitterneſs and acrimony.

Either kind of ſatire may be writ in the dialogue or epiſtolary manner; and we have inſtances of both forms in Horace, Juvenal, and Perſius. As ſome of Horace's, which are called ſatires, are as truly epiſtles; ſo many of his epiſtles might as well be called ſatires: for example, Qui ſit Mecænas, &c. might with equal reaſon, be reckoned among the epiſtles; and Primâ dicte mihi, &c. among the diſcourſes or ſatires; if the author or editor had ſo though fit.

The chief ſatiriſts among the ancients are Horace, Juvenal, and Perſius; thoſe among the moderns Regnier, Boileau, in French; and Dryden, Oldham, Rocheſter, Buckingham, Pope, Young, &c. among the Engliſh.

SATYRIASIS, in medicine, a violent deſire of venery, attended with a tenſion, and rigidity of the pudendum, occaſioned by a morbous diſpoſition of the body.

SATYRICAL, or SATIRICAL, ſomething relating to, or that partakes of the nature of ſatire.

SAVAGES, wild, barbarous people, without any fixed habitation, law, or policy.

SAUCISSE, in military affairs, a long train of powder ſowed up in a roll of pitched cloth, about two inches in diameter; ſerving to ſet fire to mines, or caiſſons.

SAUCISSON, in fortification, a kind of faggot made of large branches of trees, or of the trunks of ſhrubs bound together. Its uſe is to cover the men, and to ſerve as epaulments.

SAVIOUR, an appellation peculiarly given to Jeſus Chriſt, as being the true Meſſiah, and Saviour of the elect world.

Order of St. SAVIOUR, a religious order in the Romiſh church, founded by St. Bridget, about the year 1345; and ſo called from its being pretended that our Saviour himſelf dictated to the foundreſs its conſtitutions and rules. According to the conſtitutions, this order is principally founded for religious women who pay a particular honour to the holy virgin; but there are ſome monks of the order, to adminiſter the ſacraments, and ſpiritual aſſiſtance to the nuns.

SAUNDERS. See SANTALUM.

SAW, a well known inſtrument, ſerving to divide into pieces wood, ſtone, ivory, &c.

The beſt ſaws are of tempered ſteel ground bright and ſmooth; thoſe of iron are only hammer hardened: hence the firſt, beſides their being ſtiffer, are likewiſe found ſmoother than the laſt. They are known to be well hammered by the ſtiff bending of the blade; and to be well and evenly ground, by their bending equally in a bow.

SAWING, the application of the ſaw, in dividing timber, &c. into boards.

SAXIFRAGE, a medicinal plant, ſo called from its ſuppoſed virtue in diſſolving the ſtone; but it is rarely uſed at preſent.

SCABIOUS, *Scabioſa*, a medicinal plant, very common in the fields, ſaid to be good in aſthmas and pleuriſies; but at preſent rarely uſed.

SCAFFOLD, a timber-work, raiſed in the manner of an amphitheatre, to place ſpectators upon, for the commodious viewing a ſhew or ceremony.

SCAFFOLD, alſo ſignifies a ſmall ſtage erected for the execution of criminals.

SCAFFOLD, is alſo uſed for an aſſemblage of planks or boards ſuſtained by treſſels, pieces of wood fixed in the wall, &c. whereon maſons, painters, ſculptors, &c. ſometimes ſtand to work.

SCALADO, or SCALADE, a furious aſſault made on the wall or rampart of a city, &c. by means of ladders wherewith to ſcale the walls, without carrying on works in form to ſecure the men.

SCALE, a mathematical inſtrument, conſiſting of one or more lines drawn on wood, or metal, divided into equal or unequal parts, of great uſe in laying down diſtances in proportion, or in meaſuring diſtances already laid down.

Plain SCALE, in navigation, an inſtrument for ſolving the ſeveral caſes of ſailing by geometrical progreſſion. Conſtruction of the plain ſcale:

1. Deſcribe a ſemi-circle $abcd$, (*plate* LXXII. *fig.* 2.) and divide it into two parts by the radius bc.

2. Divide the quadrangular arch ab into nine equal parts, numbering them 10, 20, 30, &c. as you ſee in the figure, then will each diviſion anſwer to 10°; and if you draw lines from the point a to the ſeveral points 10, 20, 30, &c. in the arch ab, they will be the chords of their reſpective arches; and if each of theſe diviſions be transferred to the chord line ab, you will have a line of chords to every 10° of the quadrant; and if each of theſe diviſions be ſubdivided into 10 equal parts, and the diſtances of the ſeveral diviſions from the point a be transferred to the line ab, you will have, by this means, a line of chords to every ſingle degree.

3. From the points of the ſeveral diviſions 10, 20, 30, &c. of the quadrant ba, draw lines parallel to bc, till they cut the radius ca; then will ca be divided into a line of ſines: and if the arch ba, as was before ſuppoſed, be divided into 90 equal parts, and from the ſeveral points of diviſion be drawn lines parallel to the former, the line ac will be divided into a line of ſines anſwering to every ſingle degree of the quadrant, which muſt be numbered from c toward a.

4. By only reverting the numbers, or by numbering the ſame line of right ſines from a towards c, you will have a line of verſed ſines.

5. From a, the extreme point of the diameter, raiſe the perpendicular at; and from the centre c, through the ſeveral diviſions of the quadrant ab, draw lines till they cut the tangent at; then will the line at be a line of tangents; which muſt be numbered from a towards t.

6. If you lay your ruler from d to the ſeveral diviſions of the quadrant ab, and make a mark where it interſects the line cb, as you extend it to each diviſion, you will have a line of ſemi-tangents.

7. As the line drawn from the centre c, through the ſeveral diviſions of the quadrant ba, till they interſect the tangent line at, are the ſecants of the reſpective arches: if their lengths be transferred to the line cs, you will have a line of ſecants, which muſt be numbered from c towards s.

8. Divide the quadrant db into 8 equal parts, as in the points 1, 2, 3, 4, &c. Then ſetting one foot of the compaſſes in the point d, transfer the ſeveral diſtances $d1$, $d2$, $d3$, &c. from the arch db to the line db, and you will have a line of rhumbs, each diviſion being equal to 11° 15'.

9. Take ſeveral diviſions of each line thus conſtructed, and transfer them to right lines drawn parallel to each other, (as you ſee in *plate* LXXII. *fig.* 1.) and you will form the inſtrument called a plain ſcale.

SCALE, *Scala*, in muſick, is a denomination given to the arrangement of the ſix ſyllables invented by Guido Aretine, ut, re, mi, fa, ſol, la, called alſo gammut.

SCALE is alſo uſed for a ſeries of ſounds riſing or falling towards acuteneſs or gravity, from any given pitch of tune, to the greateſt diſtance that is fit or practicable, through ſuch intermediate degrees as make the ſucceſſion moſt agreeable and perfect, and in which we have all the harmonical intervals moſt commodiouſly divided.

Gunter's-SCALE, an inſtrument ſo called from Mr. Gunter, its inventor, and is generally made of box. There are two ſorts, the long gunter and the ſliding gunter, having both the ſame lines, but differently uſed; the former with the compaſſes, the latter by ſliding. The lines now generally delineated on thoſe inſtruments are the following, viz. a line of numbers, of ſines, tangents, verſed ſines, ſine of the rhumb, tangent of the rhumb, meridional parts, and equal parts; which are conſtructed after the following manner:

The line of numbers is no other than the logarithmick ſcale of proportionals, wherein the diſtance between each diviſion is equal to the number of mean proportionals contained between the two terms, in ſuch parts as the diſtance between 1 and 10 is 1000, &c. = the logarithm of that number. Hence it follows, that, if the number of equal parts expreſſed by the logarithm of any number, be taken from the ſame ſcale of equal parts, and ſet off

from 1 on the line of numbers, the divifion will reprefent the number anfwering to that logarithm.

Thus, if you take .954, &c. (the logarithms of 9) of the fame parts, and fet it off from 1 towards 10, you will have the divifion ftanding againft the number 9. In like manner, if you fet off .903, &c. .845, &c. .778, &c. (the logarithms of 8, 7, 6,) of the fame equal parts from 1 towards 10, you will have the divifions anfwering to the numbers 8, 7, 6. After the fame manner may the whole line be conftructed.

The line of numbers being thus conftructed, if the numbers anfwering to the natural fines and tangents of any arch, in fuch parts as the radius is 10000, &c. be found upon the line of numbers, right againft them will ftand the refpective divifions anfwering to the refpective arches; or, which is the fame thing, if the diftance between the centre and that divifion of the line of numbers, which expreffes the number anfwering to the natural fine or tangent of any arch, be fet off on its refpective line from its centre towards the left hand, it will give the point anfwering to the fine or tangent of that arch: thus the natural fine of 30° being 5000, &c. if the diftance between the centre of the line of numbers (which in this cafe is = 10000, &c. = the radius) and the divifion, on the fame line reprefenting 5000, &c. be fet off from the centre, or 90°, on the line of fines, towards the left hand, it will give the point anfwering to the fine of 30°. And after the fame manner may the whole line of fines, tangents, and verfed fines, be divided.

The line of fines, tangents, and verfed fines, being thus conftructed, the line fine of the rhumb, and tangent of the rhumb, are eafily divided; for, if the degrees and minutes anfwering to the angle which every rhumb makes with the meridian be transferred from its refpective line to that which is to be divided, we fhall have the feveral points required: thus if the diftance between the radius or centre, and the fine of 45° = the fourth rhumb, be fet off upon the line fine of the rhumb, we fhall have the point anfwering to the fine of the fourth rhumb; and after the fame manner may both thefe lines be conftructed. The line of meridional parts is conftructed from the table of meridional parts, in the fame manner as the line of numbers is from the logarithms.

The lines being thus conftructed, all problems relating to arithmetick, trigonometry, and their depending fciences, may be folved by the extent of the compaffes only; and, as all queftions are reducible to proportions, the general rule is, to extend the compaffes from the firft term to the fecond, and the fame extent of the compaffes will reach from the third to the fourth; which fourth term muft be fo continued as to be the thing required, which a little practice will render eafy.

SCALENE, SCALENUM, or SCALENOUS *Triangle*, in geometry, a triangle whofe fides and angles are all unequal.

SCALENUM, in anatomy, a mufcle of the neck, which arifeth from the firft and fecond ribs, and, afcending, is inferted into all the tranfverfe proceffes of the neck, except the firft. This mufcle is often, by anatomifts, divided into three; but fuch divifion is not of any real ufe. It is perforated for the paffage of the veins, arteries, and nerves; becaufe the neck is more eafily moved than thofe parts of the ribs to which it is faftened: therefore, it is juftly reckoned among the benders of the neck.

SCALPER, in furgery, an inftrument to rafp, and fcrape foul, carious bones.

SCAMMONY, in pharmacy, a concreted vegetable juice, partly refin, partly of the gum kind. We have two forts of it in the fhops, diftinguifhed by names formed of thofe of the places from whence they are brought, but are both the produce of the fame plant. The one kind is the Aleppo, the other is the Smyrna fcammony.

The chymical writers have given us many preparations of fcammony, among which are a tincture and a refin; but the fcammony in fubftance is preferable to either; for they both irritate more, and yet purge lefs; the refin itfelf given in an equal dofe with the crude fcammony, will give fewer ftools, and thofe attended with worfe gripings.

The ancients ufed fcammony externally for cutaneous eruptions, and to foften hard tumours; but at prefent it is ufed only as a purge. See DIAGRADIUM.

SCANDALUM MAGNATUM, in law, is a defamatory fpeech or writing to the injury of a perfon of dignity: for which a writ that bears the fame name is granted for the recovery of damages. By ftatute, no perfon is either by writing or fpeaking to publifh any falfe or fcandalous news of any lord, prelate, officer of the government, judge, &c. on pain of imprifonment, till he produce his author; and if the fame be publifhed in a libel, the publifher is indictable, and may be fined and imprifoned.

SCANDIX, Shepherd's needle, in botany, a genus of umbelliferous plants, the general corolla of which is difform and radiated, and the proper flower confifts of five heart-fhaped petals; thofe which form the difck are abortive; there is no pericarpium, but the flowers are fucceeded by two very long grains, not unlike needles, that are convex and furrowed on one fide, and flat on the other. This genus includes the chervil which grows in gardens; it is diuretick, and recommended by fome againft the gravel.

SCANNING, *Scanfio*, in poetry, the meafure of a verfe by feet, in order to fee whether or no the quantities be duely obferved. The term is chiefly ufed in regard to the Greek and Latin verfes. Thus an hexameter verfe is fcanned, by refolving it into fix feet; a pentameter, by refolving it into five feet, &c.

SCAPE-GOAT, in Jewifh antiquity, the goat which was fet at liberty on the great day of expiation. See EXPIATION.

On the day of folemn expiation, the multitude of the children of Ifrael prefented to the high-prieft at the door of the tabernacle two goats for a *fin-offering*. The high-prieft then caft lots upon the two goats, which fhould be facrificed to the Lord, and which fhould be fet at liberty, or be the *Scape-goat*, the *Azazel*, as the Hebrews call it. He that was determined by lot to be facrificed, was put to death, and offered for the fins of the people: he that was to be fet at liberty, was brought alive before the Lord. The high-prieft faid over him certain prayers, laid his two hands upon his head, confeffed the fins of the whole congregation, charged therewith the head of the goat with imprecations, then fent him into the wildernefs by a man appointed for that office, Lev. xvi. 15, &c. *The Scape-goat did bear upon him all their iniquities to a land not inhabited.* And thus both goats typified Chrift; that which was killed, prefigured his death, and that which was faved alive, the Scape-goat, his refurrection.

SCAPULA, in anatomy, the fhoulder-blade, a triangular bone, fituated on the outfide of the ribs, and commonly extended from the fecond to the feventh rib; its fuperior pofterior angle, when it is in the leaft ftraining pofition, being about three inches from the fpinal proceffes of the vertebræ, while the long fide between that angle and the inferior one is ftretched obliquely forward as it defcends, having nothing between it and the ribs, except the thin extremities of fome mufcles; but as the fcapula advances forwards to its articulation with the arm bone, its diftance from the ribs increafes.

SCAPULAR, *Scapulares*, in anatomy, a name given to two pair of arteries, and as many veins; the arteries are the external fcapular artery, which is fent from the fubclavians to the external part of the fcapula; and the internal fcapular artery, which arifes from the axillary arteries, and goes to the parts that lie under the fcapula. The fcapular veins, which are alfo external and internal, arife in like manner from the fubclavians.

SCAPUS, in architecture, the fuft or fhaft of a column.

In botany, the fame word is ufed for the ftraight ftalk or ftem of a plant, ftanding upright like a pillar or column.

SCARABÆUS, the beetle, in zoology, a numerous genus of infects, of the coleoptera order: the antennæ of the beetles are of a clavated figure, and fiffile longitudinally; and their eggs all hatch into hexapode worms, from which the young beetles are afterwards produced.

SCARIFICATION, in furgery, the operation of making feveral incifions in the fkin by means of lancets, or other inftruments, particularly the cupping inftrument.

SCARLET, a beautiful bright red. In painting in water-colours, minium mixed with a little vermillion produces a good fcarlet: but if a flower in a print is to be painted of a fcarlet-colour, the lights as well as the fhades fhould be covered with minium, and the fhaded parts

parts finifhed with carmine, which will produce an admirable fcarlet.

SCARP, in fortification, is the interior talus, or flope of the ditch next the place, at the foot of the rampart.

SCARP, in heraldry, the fcarf which military commanders wear for ornament.

SCAVENGERS, two officers chofen yearly in each parifh in London, and the fuburbs, whofe bufinefs it is to hire perfons, called rakers, and carts to cleanfe the ftreets, and carry away the dirt and filth thereof.

SCENE, in its primary fenfe, fignified a theatre, or place where dramatick pieces and other publick fhews were reprefented.

SCENE, more particularly implies the decoration of a ftage or theatre. It alfo fignifies the place reprefented, or where the action is conceived to have paffed.

SCENE, is alfo a part, or divifion, of a dramatick poem, determined by a new actor's entering.

SCENICK *Games*, *Ludi fcenici*, among the ancients, were entertainments exhibited on the fcena or theatre; including what we now call plays of all kinds, with dancing and other theatrical performances.

SCENOGRAPHY, in perfpective, a reprefentation of a body on a perfpective plane, or a delineation of it in all its dimenfions, fuch as it appears to the eye. The ichnography of a building, &c. reprefents the plan, or ground-work of the building; the orthography, the front, or upright, thereof; and the fcenography, the whole building, front, fides, the height and all.

SCENOPEGIA, in Jewifh antiquity, the fame with the feaft of tabernacles.

SCEPTRE, a kind of royal ftaff, or battoon, borne by kings, on folemn occafions, as an enfign of command and authority.

SCEPTRE, in aftronomy, one of the fix new conftellations of the fouthern hemifphere, confifting of feventeen ftars.

SCEPTICISM, the doctrines and opinions of the fcepticks, whofe diftinguifhing tenet was, that all things are uncertain and incomprehenfible, and that the mind is never to affent to any thing, but to remain in perpetual doubt and fufpence. This doctrine was alfo called Pyrrhonifm, from the name of its author.

SCHEAT, or SEAT, a fixed ftar of the fecond magnitude, in the juncture of the leg with the left fhoulder of Pegafus.

SCHINUS, in botany, a genus of plants, the corolla whereof confifts of five patent petals; the fruit is a globofe berry, containing a large globofe fingle feed.

SCHISM, a feparation, or breaking off from communion with any church; on account of fome difagreement in matters of faith or difcipline.

SCHOLASTICK, fomething belonging to the fchools.

Scholaftick was a long time a title of honour, as firft only given to fuch as diftinguifhed themfelves by their eloquence in declaiming, &c. After Nero this appellation was beftowed upon advocates, and afterwards it became reftrained to fuch as had the government of ecclefiaftical fchools, eftablifhed under the firft race of French kings, who inftructed the clerks of the church firft in the humanities, then in theology and the liturgy. Among the Greeks, this was the name of an office or dignity anfwering to our divine or theologue.

Scholaftick divinity is that part or fpecies of divinity which clears and difcuffes queftions by reafon and arguments, in which fenfe it ftands, in fome meafure, oppofed to pofitive divinity, which is founded on the authority of fathers, councils, &c. The fchool-divinity is now fallen into the loweft contempt, and is fcarce regarded any where, but in fome of the univerfities, where they are ftill by their charters obliged to teach it.

SCHOLIAST, or COMMENTATOR, a grammarian, who writes fcholia, that is, notes, gloffes, &c. upon ancient authors, who have written in the learned languages.

SCHOLIUM, a note, annotation, or remark, occafionally made on fome paffage, propofition, or the like. This term is much ufed in geometry, and other parts of mathematicks, where after demonftrating a propofition, it is cuftomary to point out how it might be done fome other way, or to give fome advice, or precaution, in order to prevent miftakes, or add fome particular ufe, or application thereof.

SCHOOL, *Schola*, a publick place, wherein the languages, humanities, or other arts and fciences are taught. Thus we fay, grammar-fchool, writing-fchool, &c.

SCHOONER, in navigation, a veffel navigated with two mafts, and two large boom-fails on the main and fore-mafts, befides the ufual fmall fails. They are generally built very light, as being principally intended for fwiftnefs, and to fail in feas which are feldom frequented with ftormy weather; fuch are the latitudes between or near the tropicks. The largeft veffels of this kind are built in the ifland of Bermuda, where they are framed of cedar.

SCIATICA, the hip-gout, being a continual, heavy, dull, gnawing pain, in or about the joint of the hip, and the parts adjacent. This diforder may arife from the fame caufe with that which produces the other gout; but it is moft generally the effect of catching cold, or being expofed to the open air. It may alfo be occafioned by contufions and venereal diforders.

In the cure of a fciatica bleeding is beneficial, except in perfons extremely weak or old; on the day after venefection, an emetick of ipecacuanha is to be given, and afterwards a paregorick draught, if neceffary. When the blood is poor, and its circulation languid, a courfe of chalybeate waters may be beneficial; but, in the oppofite extreme, a milk diet, with the teftaceous powders, are to be ufed.

SCIENCE, *Scientia*, in philofophy, denotes any doctrine, deduced from felf-evident and certain principles, by a regular demonftration. Science may be properly divided as follows: 1. The knowledge of things, their conftitutions, properties, and operations; this, in a little more enlarged fenfe of the word, may be called φυσικὴ, or natural philofophy; the end of which is fpeculative truth.

2. The fkill of rightly applying thefe powers, πρακτικὴ: the moft confiderable under this head is ethicks, which is the feeking out thofe rules and meafures of human actions that lead to happinefs, and the means to practife them; and the next is mechanicks, or the application of the powers of natural agents to the ufe of life.

3. The doctrine of figns, σημειωτικὴ; the moft ufual of which being words, it is aptly enough termed logick.

This, fays Mr. Locke, feems to be the moft general, as well as natural, divifion of the object of our underftanding. For a man can employ his thoughts about nothing but either the contemplation of things themfelves for the difcovery of truth; or about the things in his own power, which are his actions, for the attainment of his own ends; or the figns the mind makes ufe of, both in the one and the other, and the right ordering of them for its clear information.

All which three, viz. things, as they are in themfelves knowable; actions, as they depend on us in order to happinefs; and the right ufe of figns, in order to knowledge, being *toto cœlo*, different, they feem to be the three great provinces of the intellectual world, wholly feparate and diftinct one from another.

SCIENTIFICK, or SCIENTIFICAL, fomething relating to the pure, fublimer fciences; or that abounds in fcience and knowledge.

SCILLA, the fquill, a large root of the bulbous kind. It is of two kinds, the white and the red, differing little otherwife than in colour, though the roots of two different fpecies of plants. It is not a folid and uniformly flefhy root, but is compofed of a number of thick coats or fkins like an onion, of a faint raw fmell, and an extremely acrid and naufeous tafte. Squills are brought to us from the coafts of Spain, where they grow in great abundance. They are to be chofen large, found, frefh, and full of juice, firm throughout, and not flabby in any part.

The fquill is extremely acrid, attennuant, and diffolvent: it is apt to prove emetick, in whatever form it is given, but this may be prevented by adding a few grains of cinnamon to it, and by this means it is rendered a powerful medicine in all obftructions of the vifcera: it promotes urine and the menfes, and cuts the tough phlegm, which almoft choaks people in afthmas, and many other diforders of the breaft. The moft ufual form in which it is prefcribed, is that of the oxymel, compofed of a ftrong infufion of the root in vinegar, and made into a firup with honey.

SCIOPTICK, a ſphere, or globe of wood, with a circular hole or perforation, wherein a lens is placed. It is ſo fitted that, like the eye of an animal, it may be turned round every way, to be uſed in making experiments of the darkened room.

SCIRE-FACIAS, in law, a judicial writ moſt commonly iſſued to call a perſon to ſhew cauſe to the court whence it iſſues, why execution of a judgment paſſed ſhould not be made out; as where a plaintiff has recovered debt or damages in a court of record, and does not take out execution in a year and a day after judgment recovered; in that caſe he ſhall have this writ to ſummon the defendant to ſhew cauſe why execution ſhould not be had againſt him upon the ſaid judgment; which, if the defendant does not, judgment is given, and the plaintiff ſhall have execution. Where a plaintiff or defendant dies, execution may not be ſued out on a judgment till the writ of ſcire-facias is brought, and judgment given thereupon. A ſcire-facias muſt likewiſe iſſue where judgment is recovered againſt a femme ſole who marries within the year and day, to ſummon the huſband to ſhew cauſe, &c. And when a judgment is obtained againſt a teſtator, a ſcire-facias iſſues againſt the executor, though within a year after the judgment is had; and alſo againſt an adminiſtrator to an inteſtate.

SCIRRHUS, in ſurgery, a hard tumour without pain, though not abſolutely without ſenſation. A ſcirrhus may be produced by whatever is capable of coagulating, inſpiſſating, or drying the liquids in the glands; and, therefore, the ſcirrhus may be in any of the glands, but eſpecially ſuch as contain an eaſily inſpiſſated liquor, or from their ſituation, diſpoſe their contents to a ſtagnation. The efficacy of quickſilver, in removing obſtructions, is univerſally known, and both the internal and external uſe of it has often greatly contributed to the cure of a benign and beginning ſcirrhus; for when it has acquired a ſtony hardneſs, and begins to be malignant, no relief can be expected from the ſtrongeſt mercurial preparations, nor from a ſalivation excited by quickſilver, but all the ſymptoms are rather increaſed by theſe means; and, in conſequence of the increaſed motion of the humours, the ſcirrhus is ſooner changed into a cancer. See CANCER.

When the ſcirrhus will not yield to medicines, if its place, ſituation, adjacent parts, mobility, the ſtate of the diſorder, and the ſtrength and condition of the patient permit, it is with all expedition to be totally extirpated with the knife.

SCIRRHUS *Hepatis*, in medicine, a diſeaſe conſiſting in an indurated tumour of the liver, occaſioned by a ſtagnation of the humours which grow thick there, from an exhalation of their more fluid and ſubtile parts. This differs from the infarctus hepatis, not only in degrees but in its ſymptoms, for it almoſt always is attended with a hectick, or with œdomato-hydropick ſwellings.

SCLAVONICK, the language of the Sclavi, an ancient people of Scythia Europæa; who, about the year 518, quitting their native country, ravaged Greece, and eſtabliſhed the kingdoms of Poland and Moravia, and at laſt ſettled in Illyria, which thence took the name of Sclavonia.

SCLEROPHTHALMIA, a diſeaſe of the eye, attended not only with a hardneſs and ſlowneſs of motion, but alſo with a pain and redneſs.

SCLEROTICA, one of the membranes of the eye. See EYE.

SCOLOPENDRA, in zoology, an inſect with a very ſlender and long body, and furniſhed with a vaſt number of legs. According to Dale, it is ſometimes uſed as a depilatory, boiled in wine.

SCOLOPOMACHÆRION, in ſurgery, a knife reſembling a woodcock's bill, uſed in opening and dilating narrow wounds in the breaſt, abſceſſes, &c.

SCONCE, in fortification, a ſmall field fort, built for the defence of ſome paſs, or other poſt. See the article FORT.

SCOPARIA, in botany, a genus of plants, whoſe flower is monopetalous, rotated, patent, and divided at the brim into four ſegments: the fruit is an oblong, conick acuminated capſule, with one cell, opening with two valves, and contains a number of oblong ſeeds.

SCOPER-HOLES, or SCUPER-HOLES, in a ſhip, are holes made through the ſides cloſe to the deck to carry off the water that comes from the pump, or any other way.

SCORBUTUS, the ſcurvy, in medicine. See SCURVY.

SCORDIUM, water-germander, in botany, a plant which is looked upon as aperient, diaphoretick, and pectoral, and is juſtly eſteemed a good alexipharmick, and accordingly is preſcribed in malignant diſorders; it is a principal ingredieat in the confectio fracaſtorii, which takes its name of diaſcordium from it. See the article DIASCORDIUM.

This plant is comprehended by Linnæus among the teucriums. See TEUCRIUM.

SCORIA, droſs, among metallurgiſts, is the recrements of metals in fuſion; or more determinately ſpeaking, is that maſs which is produced by melting metals and ores, and when cold is brittle, and not diſſoluble in water, being properly a kind of glaſs.

SCORIFICATION, in metallurgy, is the art of reducing a body, either entirely or in part, into ſcoria. See the preceding article.

SCORPIO, the Scorpion. See SCORPION.

SCORPION, *Scorpio*, in zoology, a genus of wingleſs inſects, the body of which is of an oval figure; the tail is long and ſlender, and the whole body covered with a firm and ſomewhat hard ſkin; the eyes are eight in number, two of which are placed contiguous, and ſix ſideways; the legs are eight; and there is alſo a pair of claws at the head, and a pointed weapon at the extremity of the tail. The great yellowiſh Barbary ſcorpion, with eight denticulations, when full grown, meaſures ſix or ſeven inches in length: there are ſeveral other ſpecies.

SCORPION, *Scorpio*, in aſtronomy, the eighth ſign of the zodiack, denoted by this character, ♏. (See *plate* IV. *fig.* 8.) The ſtars in Scorpio, in Ptolemy's catalogue, are 20; in that of Tycho, 10; but in that of Mr. Flamſtead, 49.

SCORPION, in the ancient art of war, an engine chiefly uſed in the defence of the walls of fortified places, by throwing arrows, fire-balls, or great ſtones.

SCORZONERA, Viper's-graſs, in botany, a genus of plants, whoſe flower is compound, imbricated and uniform. The root of this plant abounds with a milky juice of a bitteriſh, ſubacrid taſte, and is ſaid to ſtrengthen the ſtomach, and promote urine and ſweat; and, boiled, is reckoned a very good food.

SCREW, or SCRUE, *Cochlea*, one of the five mechanical powers. A ſcrew is a cylinder cut into ſeveral concave ſurfaces, or rather a channel or groove made in a cylinder, by carrying on two ſpiral planes the whole length of the ſcrew, in ſuch a manner, that they may be always equally inclined to the axis of the cylinder in their whole progreſs, and alſo always inclined to the baſe of it in the ſame angle. See MECHANICK *Powers*.

SCRIBE, an officer among the Jews, whoſe buſineſs was to write; of which there were three kinds: the firſt and principal of which were the ſcribes of the law, whoſe office was to write and interpret ſcripture; theſe were in great credit and eſteem among the Jews, and had even the precedency of the prieſts and ſacrificers, and their deciſions were received with almoſt the ſame reſpect as the law of God itſelf: the ſecond kind, properly called the ſcribes of the people, were a ſort of magiſtrates: and the third were publick notaries, or ſecretaries of the council; which were the leaſt conſiderable.

SCRIBING, in joinery, &c. is a term uſed when one ſide of a piece of ſtuff is to be fitted to another that is irregular. In order to make theſe join cloſe all the way, they ſcribe it; that is, they lay the piece to be ſcribed cloſe to the other they intend to ſcribe to, and opening their compaſſes to the wideſt diſtance theſe two pieces ſtand from each other, they bear the point of one of the legs againſt the ſide they intend to ſcribe to, and with the other point draw a line on the ſtuff to be ſcribed. Thus they form a line on the irregular piece parallel to the edge of the regular one; and if the ſtuff be cut exactly to the line, when theſe pieces are put together they will ſeem a joint.

SCRIPTURE, an appellation given, by way of eminence, to the ſacred and inſpired writings of the Bible.

SCROPHULA, in medicine, the king's evil.

The cure of this diſeaſe is to be attempted by bleeding, purging, and ſuch medicines as are moſt proper for

correcting the vifcidity, faltnefs, and acrimony of the humours. The beft cathartick is dulcified mercury fix times fublimed, which fhould be joined with rhubarb for children; but to adults it may be given alone, with a gentle purging draught fome hours after it. The next to this in virtue is jalap. And our purging waters are alfo ufeful, as they fcour the glands, and open the body at the fame time. In fine, a pill compofed of mercury fix times fublimed, and precipitated fulphur of antimony, each one grain; of aloes, three or four grains made up with the firup of balfam, and taken every night, will be found ferviceable not only in this difeafe, but in others arifing from vifcid humours.

The medicines which correct this pravity of the blood and humours, are, for the moft part, of the diuretick kind, fuch as burnt fponge, the diuretick falt, and vitriolated tartar; which are the more proper, becaufe they are fomewhat laxative. To thefe may be added the lefs compound lime water.

For my part, I have very often experienced the good effects of the following powder, taken twice a day, with three or four glaffes of the aforefaid water. Take of burnt fponge, one fcruple; of purified nitre, corraline, and white fugar, each 10 grains: mix thefe together. *Mead.*

SCROPHULARIA, figwort, in botany, a genus of plants, whofe flower is monopetalous and unequal. A fpecies of this genus, which grows wild in divers parts of England, is faid to be excellent in fcrophulous diforders; and is efteemed externally as a remedy for the piles; it is generally made into an ointment for thefe purpofes, and is alfo given internally in diet drinks.

SCROTUM, in anatomy, the capfula or bag in which the tefticles are contained, and which hangs down below the penis. See TESTICLE.

SCROTUM *Cordis*, the fame with pericardium. See PERICARDIUM.

SCROWLS, or SCROLLS, in architecture, the fame with volutes.

SCRUPLE, a weight equal to the third part of a drachm, or to 20 grains. Among goldfmiths it is equal to 24 grains.

The fcruples of the moon, &c. eclipfed, are the parts of the moon's diameter immerfed in the fhadow, expreffed in the fame meafure wherein the apparent diameter of the moon is expreffed. The fcruples of half duration are an arch of the moon's orbit, which the centre of the moon defcribes, from the beginning of an eclipfe to its middle. Scruples of immerfion are an arch which the moon's centre defcribes, from the beginning of the eclipfe to its middle. And fcruples of emerfion, are an arch of the moon's orbit, defcribed by her centre from the time of the emerfion of her limb to the end of the eclipfe.

SCRUTINY, a ftrict examination of the feveral votes taken at an election, in order to difcover unqualified voters.

SCULPTURE, an art by which, in taking away, or adding to matter, all forts of figures are formed by the hand, either in ftone, wood, wax, or metal. In its full latitude it fignifies both the art of working in creux, properly called engraving, and of working in relievo, which is more ftrictly called fculpture.

The firft works in fculpture were with clay, not only in making ftatues, but in forming models; and to this day, a fculptor never undertakes any thing confiderable, without forming a model either in clay or wax. In making figures of thefe materials, they begin and finifh their work with their hands, ufing only three or four pieces of wood, which are roundifh at one end, and at the other flat, with a fort of claws and teeth, which are to fmooth and fcratch the work. For waxen models, to every pound of wax add half a pound of colophony; fome add turpentine, and melt it together with oil of olives; more or lefs of the latter being ufed, as they would have the matter hard or foft: fome alfo add a little vermillion, to give it a colour: this is wrought and moulded with the fingers like clay.

For fculpture in wood, which we properly call carving, the firft thing required is to chufe wood proper for the work the fculptor is to perform. If it be any thing large, and requires a great deal of ftrength and folidity, the hardeft and moft durable wood is to be chofen; and for fmaller works and ornaments, the fofter wood is ufed; but it muft be fuch, however, as is firm and clofe: for a large work, though it be only a fingle figure, it is better to make ufe of feveral pieces of wood, or bits of board, glued together, than of one whole piece, which is more liable to crack; for a thick piece of wood may not be dried to the heart, however it may appear on the outfide. Carving is performed with a great variety of chiffels and other tools, for pairing, fcooping, rounding, &c. the feveral parts of the work.

In fculpture in marble and other ftone, the firft thing to be done is to faw out a block of marble, of the bignefs of the work to be performed; and this being done, the fuperfluities are to be taken off by a ftubbed point and a heavy mallet; thus, bringing near the meafures required, the fculptor reduces it ftill nearer with a finer tool, called a dog's tooth, it having two points, but one not fo fharp as the other. After this he makes ufe of his gradine, which is a flat cutting tool, with three teeth; he then takes off, with a fmooth chiffel, the fcratches the gradine left on the marble, and ufes it with dexterity and delicacy, to give foftnefs and tendernefs to his figure; till at length, taking rafps of different degrees of finenefs, the work is gradually rendered fit for polifhing. To polifh the work the fculptor ufes pumice-ftone and fmalt, then he goes over it with tripoli; and when he would give it more luftre, rubs it with leather and ftraw-afhes. There are feveral other tools ufed by fculptors, adapted to the different parts of the work, and the nature of the ftone they make ufe of.

As the models of clay fhrink when they go dry, whenever fculptors undertake a confiderable piece of work, they only ufe the model for making a mould of plafter or ftucco, in which is formed a figure of the fame matter, which thenceforth ferves for a model, and by which they adjuft all their meafures and proportions. To proceed the more regularly, on the head of the model they place an immoveable circle, divided into degrees, with a moveable rule or index, fixed in the centre of the circle, and divided alfo into equal parts: from the end of the rule hangs a line with a plummet, which ferves to take all the points, to be transferred thence to the block of marble, from whofe top hangs another plummet, like that of the model. But there are fome excellent fculptors, who difapprove of this method; urging, that the fmalleft motion of the model changes their meafures, for which reafon they choofe to take all their meafures with the compaffes.

SCUM, properly denotes the impurities which a liquor, by boiling, cafts up to the furface. See CLARIFICATION. The term fcum is alfo ufed for what is more properly called the fcoria of metals. See SCORIA. In this laft fenfe, the fcum of lead is a fort of fmalt, of various colours; and the fcum of filver is what we commonly call litharge. See LITHARGE.

SCUPPERS, in fhip-building, fmall channels cut through the fhip's fide, with a gradual flope from the decks. They are ufed to carry off the water which may lie on the deck; for which purpofe there is frequently a leathern pipe nailed on the outfide all round the fcupper-hole, to carry the water down without ftaining or dirting the veffel's fide. Thefe are termed fcupper-holes.

SCURVY, *Scorbutus*, a name given by medicinal writers to a difeafe fo various and different in appearance, that it does not feem to be one and the fame diftemper. In the northern countries it has always been common, and the nearer they are to the fea, the more fevere it proves: accordingly the Danes, Norwegians, and other inhabitants of the coafts of the Baltick, are vaftly afflicted with it; nor do the Germans, Dutch, or our own countrymen, efcape its fury.

It begins by foul ulcers in the mouth and legs, whence it is called ftomacace and fceletyrbe by Pliny, who imputes it to the bad qualities of water, and fays, that the herba Britannica, which is believed to be the hydrolapathum nigrum of Muntingius, or great water-dock, was found to be its cure. But the difeafe was known long before Pliny's time: for Hippocrates defcribes it by the name of σπλην μεγας, or great fpleen; and fays, likewife, that it arifes from drinking cold, crude, turbid waters.

Scurvy grafs and all the fpecies of garden and water creffes, horfe radifh, the roots of wild radifh, and muftard, are juftly looked upon as antifcorbuticks, for they induce a furprifing change both in the difordered fluids and folids. To thofe may be added the roots of gentian and fuccory, the leaves of fcordium, carduus benedictus, worm-

wormwood, the leſſer centaury, water trefoil, or bucks beans: balſamicks and corroboratives, as juniper berries, the tops of fir and pine trees, Winters bark, cortex eleutheriæ, and the Peruvian bark: the gums ammoniack, ſagapenum and galbanum; and the woods ſaſſafras, guaiacum, and aloes.

Medicines which allay the pains and ſpaſms, are the fat of animals, cream, oil of ſweet almonds, ſperma ceti, caſtor, aſſa fœtida, extracts of yarrow and chamomile, diaſcordium, ſaffron, earth worms, elk hoof, &c.

As to evacuations, bleeding ſhould be uſed with the greateſt caution; and none but the gentleſt purges ſhould be uſed, ſuch as ſenna, rhubarb, or manna; alſo pills made after the manner of Bedner, with depurated aloes, extract of rhubarb, bitter herbs, and temperate balſamick ingredients.

The diureticks ſhould not be ſtronger than the decoction of the roots of parſley, celery, fennel, and aſparagus.

The ſafeſt diaphoreticks are dulcified ſpirit of nitre, flowers of ſulphur, æthiops mineral, infuſions in the manner of tea of Paul's betony, carduus benedictus, ſcordium, and elder flowers, diaphoretick antimony, calcined and uncalcined hartſhorn, amber, native cinnabar, cinnabar of antimony, and compound powder of crabs claws: theſe things are adapted to a cold ſcurvy. But in the hot or alkaline, ſcurvy graſs is too hot to be adminiſtered alone; wherefore it ſhould be corrected with acids, ſuch as wood ſorrel, the juices of citrons, oranges, barberries, and pomegranates; this ſhould be accompanied with milk meats, almond emulſions, barley-broths, water gruel, chicken broths, with endive, lettuce, ſorrel, and creſſes, at intervals.

When the ſcurvy proceeds from muriatick ſalts, which happens to thoſe who live on ſmoked or high ſalted fiſh or fleſh, then whey, copiouſly drank, produces good effects; as alſo citrons, china oranges, and ripe fruits; whereas ſpirituous and volatile antiſcorbuticks are generally detrimental.

Heiſter ſays, that when there is a continual ſalt taſte in the mouth, lime water drank morning and evening, is a high ſpecifick. The late biſhop of Cloyne ſays, that if he may truſt what trials he has been able to make, tar water is good in the ſeveral ſorts of ſcurvy, whether alkaline, acid, or muriatick; and that he believes it to be the only medicine that cures them all, without doing hurt in any.

In a high degree of the ſcurvy mercurial ſalivation is looked upon by many as the only cure; which, by the vehement ſhock it gives the whole frame, and the ſenſible ſecretion it produces, may be thought to be more adequate to ſuch an effect; but the diſorder occaſioned by that violent proceſs, it is to be feared may never be got over.

SCUTIFORME Os, in anatomy, the chief bone of the knee, called alſo patella, mola, &c. See PATELLA.

SCUTIFORMIS CARTILAGO, in anatomy, one of the cartilages of the larynx, the broadeſt and biggeſt of them all, called alſo thyroides. This cartilage is of a quadrangular figure, and ſtands in the interior part, where the pomum adami makes its prominence, whence it is ſometimes called the anterior cartilage. It is gibbous withoutſide, and hollow within; ſometimes double, chiefly in women, in whom it does not advance ſo far forward as in men.

SCUTTLES, in a ſhip, ſquare holes cut in the deck, big enough to let in the body of a man, ſerving to let people down into any room below, upon occaſion, or from one deck to another. They are generally before the main maſt, before the knight in the fore caſtle; in the gun room, to go down to the ſtern ſheets; in the round houſe, to go down into the captain's cabin, when forced by the enemy in a fight aloft. There are alſo ſome ſmaller ſcuttles, which have gratings over them: and all of them have covers, that people may not fall down through them in the night.

Scuttle is alſo a name given thoſe little windows and long holes which are cut out in cabins, to let in light.

SCYTALA, in mechanicks, a term uſed by ſome writers, for a kind of radius, or ſpoke, ſtanding out from the axis of a machine, as an handle or lever to turn it round and work it by.

SCYTALA LACONICA, a ſtratagem or device of the Lacedemonians, for the ſecret writing of letters to their correſpondents, ſo that if they ſhould chance to be intercepted, nobody might be able to read them. To this end they had two wooden rollers or cylinders, perfectly alike and equal, one whereof was kept in the city, and another by the perſon to whom the letter was directed. For the letter, a ſkin of very thin parchment was wrapped round the roller, and thereon was the matter written; which done, it was taken off, and ſent away to the party, who upon putting it in the ſame manner upon his roller, found the lines and words in the very ſame diſpoſition as when they were firſt written.

SEA, *Mare*, in geography, is frequently uſed to ſignify that vaſt body of water encompaſſing the whole earth, more properly called ocean. Sea is more properly uſed for a particular part or diviſion of the ocean; denominated from the country it waſhes, or other circumſtances. As the Iriſh Sea, Mediterranean Sea, Baltick Sea, North Sea, Red Sea, &c. The ſea differs in ſaltneſs in different parts; it is in general obſerved, that in the hotteſt climates the water is ſalteſt.

SEA *Breaches*, a term uſed by the farmers to expreſs the over-flowing of their low lands near the ſea by the ſea water.

Sea ſalt, moderately uſed, is a great improvement to all lands, but too much of it kills all ſorts of vegetables except ſuch as nature has intended to live among it. The ſea, breaking in upon lands thus, injures them greatly.

SEAL, *Sigillum*, a puncheon, or piece of metal, or other matter, uſually either round or oval, whereon are engraven the arms, device, &c. of ſome prince, ſtate, community, magiſtrate, or private perſon, often with a legend or ſubſcription, the impreſſion whereof, in wax, ſerves to make acts, inſtruments, &c. authentick.

Before the time of William the Conqueror, the makers of all deeds only ſubſcribed their names, adding the ſign of the croſs, and a great number of witneſſes; but that monarch, and the nobility, uſed ſeals with their arms on them, which example was afterwards followed by others. The colour of the wax wherewith this king's grants were ſealed was uſually green, to ſignify that the act continued freſh for ever, and of force.

A ſeal is abſolutely neceſſary in reſpect of deeds, becauſe the ſealing of them makes perſons parties thereto, and without being ſealed, they are void in law. It is held, that if a ſeal be broken off, it will render the deed void, and that where ſeveral are bound in a bond, the pulling off the ſeal of one vacates it as to all the reſt.

The king's great ſeal is that whereby all patents, commiſſions, warrants, &c. coming from the king are ſealed. The keeping hereof is in the hands of the lord high chancellor, who is hence denominated lord keeper. Indeed there is ſome difference between the lord chancellor and lord keeper, not in office, but in the manner of creation, the latter being made by the delivery of the great ſeal to him by the king, but the former having a patent. The king's privy ſeal is a ſeal that is uſually firſt ſet to grants that are to paſs the great ſeal.

SEAL is alſo uſed for the wax or lead, and the impreſſion thereof, affixed to the thing ſealed.

SEALER, an officer in chancery, appointed by the lord chancellor or keeper of the great ſeal, to ſeal the writs and inſtruments there made in his preſence.

SEALING, in architecture, the fixing a piece of wood or iron in a wall with plaſter, mortar, cement, lead, and other ſolid binding. For ſtaples, hinges, and joints plaſter is very proper.

SEALING WAX. See WAX.

SEAM, or SEME *of Corn*, is a meaſure of eight buſhels.

SEAM *of Glaſs*, the quantity of 120 pounds, or 24 ſtones, each five pounds weight. The ſeam of wood is an horſe-load.

SEAMS, in ſhip-building, the interſtices between the planks in a ſhip's decks, ſides, or bottom: they are filled with a quantity of oakum, or old ropes untwiſted and drawn aſunder, after which they are covered with hot melted pitch, to prevent the entrance of the water.

SEAR CLOTH, or CERE CLOTH, in ſurgery, a form of external remedy ſomewhat harder than an unguent, yet ſofter than an emplaſter, though it is frequently uſed both for the one and the other.

SEASIN, or SEASING, in a ſhip, the name of a rope by which the boat rides by the ſhip's ſide when in harbour, &c.

SEASONS, in coſmography, certain portions or quarters

quarters of the year, diſtinguiſhed by the ſigns which the earth then enters, or by the meridian altitudes of the ſun, conſequent on which are different temperatures of the air, different works in tillage, &c. The year is divided into four ſeaſons, ſpring, ſummer, autumn, and winter. The beginnings and endings of each whereof, ſee under its proper article, SPRING, &c.

SEAT, in the menage, the poſture or ſituation of a horſeman upon the ſaddle.

SEBESTEN, *Cordia*, in botany, a genus of plants, whoſe flower is monopetalous and funnel-ſhaped. The fruit of a ſpecies belonging to this family of plants, are brought from Syria and Egypt, and are uſed in medicine: they are moderately cooling and emollient, and help to obtund the acrimony of the humours; they are therefore recommended in defluxions, catarrhs, ſharpneſs of urine, billious fevers and coſtiveneſs; but in the preſent medical practice are not much in uſe.

SECALE, RYE, in botany. See RYE.

SECANT, in geometry, is a line that cuts another, or divides it into two parts. See LINE. In trigonometry, the ſecant denotes a right line drawn from the centre of a circle, which cutting the circumference, proceeds till it meets with a tangent to the ſame circle.

SECOND, in geometry, chronology, &c. the 60th part of a prime or minute, whether of a degree or of an hour: it is denoted by two ſmall accents, thus (″).

SECOND, in muſick, one of the muſical intervals; being only the difference between any ſound and the next neareſt ſound, whether above or below it. See INTERVAL.

SECONDARY, in general, ſomething that acts as ſecond, or in ſubordination to another. Secondary circles of the ſphere, are circles paſſing through the poles of ſome great circle: thus the meridians and hour-circles are ſecondaries to the equinoctial.

There are alſo ſecondaries paſſing through the poles of the ecliptick, by means of which all ſtars are referred to the ecliptick.

SECRETARY, an officer, who, by his maſter's orders, writes letters, diſpatches, and other inſtruments, which he renders authentick by his ſignet.

Of theſe there are ſeveral kinds; as, 1. Secretaries of ſtate, who are officers that have under their management and direction the moſt important affairs of the kingdom, and are obliged conſtantly to attend on the king: they receive and diſpatch whatever comes to their hands, either from the crown, the church, the army, private grants, pardons, diſpenſations, &c. as likewiſe petitions to the ſovereign, which, when read, are returned to them; all which they diſpatch according to the king's direction.

2. Secretary of an embaſſy, a perſon attending an ambaſſador for writing diſpatches relating to the negociation. There is a great difference between the ſecretary of an embaſſy and the ambaſſador's ſecretary; the laſt being a domeſtick or menial of the ambaſſador, and the firſt a ſervant or miniſter of the prince.

3. Secretary of war, an officer of the war-office, who has two chief clerks under him, the laſt of which is the ſecretary's meſſenger. There are alſo ſecretaries in moſt of the other offices.

SECRETION, *ſecretio*, the act whereby the ſeveral juices or humours of the animal body are ſeparated from the blood by means of the glands.

It is a thing well known to philoſophers, and particularly to chymiſts, that a piece of waſte paper, which conſiſts of a parcel of filaments connected together, being once ſoaked in oil or water, will not ſuffer any other liquor to paſs through it, but ſuch as it was ſaturated with before, ſtopping all others. It is alſo known that ſcraps of cloth or cotton imbued with oil or water, and dipped in a veſſel, in which oil and water are mixed together, that which was ſaturated with water will ſuffer nothing to paſs but water, and that which had the oil will let nothing paſs but oil.

There are to be found in the ſecretory veſſels of the glands a ſimilar ſtructure, an interwoven maſs of filaments very like thoſe of paper, cloth, or cotton, though diſpoſed a little differently. This texture, once filled with a certain juice, will let none paſs through of all the juices that come to the orifices of theſe veſſels, but that with which they were already ſaturated.

This being ſo, the blood which we ought to conſider not as a homogeneous fluid, but as compoſed of an infinity of parts, or different molecules, ſuch as oily, mucilaginous, watery, ſubtile, and groſſer ſaline particles, being carried by the arteries into the gland, divides itſelf into all the ramifications of the artery where it is infinitely extended, and wherein all the molecules are obliged to file off, as it were one by one, by the ſtraight paſſage of the artery into the vein, and conſequently to roll over the orifices of the ſecretory veſſels of the glands, whoſe villous texture is before ſaturated with a juice of a certain nature; and theſe particles, which are of the ſame nature with that juice which preſents itſelf at the orifice or entrance of the ſecretory veſſels, join themſelves to it, and enter with the greater liberty, being puſhed on by thoſe that follow them; ſo that they ſucceſſively run through the whole veſſel, and at length paſs out by the excretory canal; whilſt the others, which are not of the ſame nature, roll over the orifice of the ſecretory veſſels, without ever mingling with the juice they meet there, and paſs on to the returning vein to go to the heart again.

For the uſe, &c. of the animal ſecretions, ſee the articles EXCREMENT and EXCRETION.

SECT, *Secta*, a collective term, comprehending all ſuch as follow the doctrines and opinions of ſome famous divine, philoſopher, &c. The principal ſects among the ancient philoſophers were the Epicureans, Peripateticks, Academicks, Stoicks, Pyrrhoniſts, &c. Among the moderns, the Newtonian, Carteſians, Hutchinſonians, &c. are the principal ones in Europe.

And the Calviniſts, Lutherans, Papiſts, Independents, Anabaptiſts, Arians, Socinians, Arminians, &c. are the principal ſects to be found among modern divines.

SECTION, in general, denotes a part of a divided thing, or the thing itſelf. Such particularly are the ſubdiviſions of a chapter called alſo paragraphs and articles: the mark of a ſection is §.

SECTION, in geometry, denotes a ſide or ſurface appearing of a body or figure cut by another; or the place where lines, planes, &c. cut each other. The common ſection of two planes is always a right line; being the line ſuppoſed to be drawn on one plane by the ſection of the other, or by its entrance into it.

SECTION *of a Building*, in architecture, is the ſame with its profile; or a delineation of its heights and depths raiſed on a plane, as if the fabrick was cut aſunder to diſcover its inſide.

Conick SECTIONS, in geometry. See the articles CONE and CONICK.

SECTOR, in geometry, is a part of a circle, comprehended between two radii and the arch; or it is a mixed triangle, formed by two radii and the arch of a circle.

SECTOR is alſo a mathematical inſtrument, of great uſe in finding the proportion between quantities of the ſame kind, as between lines and lines, ſurfaces and ſurfaces, &c. for which reaſon the French call it the compaſs of proportion. The great advantage of the ſector above common ſcales, &c. is, that it is adapted to all radii, and all ſcales. For, by the line of chords, ſines, tangents, &c. on the ſector, we have lines of chords, ſines, tangents, &c. adapted to any radius between the length and breadth of the ſector, when opened.

Deſcription of the SECTOR. This inſtrument conſiſts of two equal legs, or rules of braſs, &c. riveted together, but ſo as to move eaſily on the rivet; on the faces of the inſtrument are placed ſeveral lines; the principal of which are the line of equal parts, line of chords, line of ſines, line of tangents, line of ſecants, and line of polygons.

The line of equal parts, called alſo the line of lines, marked L, is a line divided into 100 equal parts, and, where the length of the leg will admit it, each of theſe is ſubdivided into halves and quarters. It is found on each leg, on the ſame ſide, and the diviſions numbered 1, 2, 3, 4, 5, &c. to 10, which is near the extremity of each leg. Note, in practice, 1 repreſents either 1, 10, 100, 1000, 10000, &c. as occaſion requires, in which caſe, 2, repreſents 2, 20, 200, 2000, 20000, &c. and ſo of the reſt. The line of chords, marked C on each leg, is divided after the uſual manner, and numbered 10, 20, 30, &c. to 60. The line of ſines, denoted on each leg by the letter S, is a line of natural ſines, numbered 10, 20, 30, &c. to 90. The line of tangents, denoted on each leg by the letter T, is a line of natural tangents, numbered 10, 20,

20, 30, &c. to 45. Besides which there is another little line of tangents on each leg, commencing at 45°, and extending to 79°, denoted by the letter *t*. Line of secants, denoted on each leg by the letter *s*, is a line of natural secants, numbered 10, 20, 30, &c. to 75, not commencing at the centre of the instrument, but at some distance therefrom. The line of polygons, denoted by the letter P on each leg, is numbered 4, 5, 6, &c. to 12, which falls considerably short of the centre of the instrument.

Use of the Line of equal Parts on the SECTOR.

1. To divide a given line into any number of equal parts, suppose seven. Take the given line in your compasses, and setting one foot in a division of equal parts, that may be divided by seven, for example, 70, whose seventh part is 10, open the sector till the other point falls exactly on 70, in the same line on the other leg. In this disposition, applying one part of the compasses to 10, in the same line, shut them till the other fall in 10, in the same line, on the other leg, and this opening will be the seventh part of the given line. Note, if the line to be divided be too long to be applied to the legs of the sector, divide only one half, or one fourth, by 7, and the double or quadruple thereof will be the seventh part of the whole.

2. To measure the lines of the perimeter of a polygon, one of which contains a given number of equal parts. Take the given line in your compasses, and set it parallel, upon the line of equal parts, to the number on each leg expressing its length. The sector remaining thus, set off the length of each of the other lines parallel to the former, and the numbers each of them falls on, will express their lengths.

3. A right line being given, and the number of parts it contains, suppose 120, to take from it a shorter line, containing any number of the same parts, suppose 25. Take the given line in your compasses, open the sector till the two feet fall on 120 on each leg; then will the distance between 25 on one leg, and the same number on the other, give the line required.

4. To multiply by the line of equal parts on the sector. Take the lateral distance from the centre of the line to the given multiplicator; open the sector till you fit that lateral distance to the parallel of 1 and 1, or 10 and 10, and keep the sector in that disposition; then take in the compasses the parallel distance of the multiplicand, which distance, measured laterally on the same line, will give the product required. Thus, suppose it were required to find the product of 8, multiply by 4: take the lateral distance from the centre of the line to 4 in your compasses, i. e. place one foot of the compasses in the beginning of the divisions, and extend the other along the line to 4. Open the sector till you fit this lateral distance to the parallel of 1 and 1, or 10 and 10. Then take the parallel distance of 8, the multiplicand; i. e. extend the compasses from 8, in this line, on one leg, to 8 in the same line on the other, and that extent, measured laterally, will give the product required.

5. To divide by the line of equal parts on the sector. Extend the compasses laterally from the beginning of the line to 1, and open the sector till you fit that extent to the parallel of the divisor; then take the parallel distance of the dividend, which extent, measured in a lateral direction, will give the quotient required. Thus suppose it was required to divide 36 by 4; extend the compasses laterally, the beginning of the line to 1, and fit to that extent the parallel of 4, the divisor; then extend the compasses parallel, from 36 on one leg to 36 on the other, and that extent, measured laterally, will give 9, the quotient required.

6. To work any proportion by the sector. Take the second term lateral, and, opening the sector, apply that extent parallel in the first term, and stay the sector in that position; then take the parallel distance of the third term, which extent, measured laterally, gives the fourth term required. This is so easy, from what has already been said, that it needs no example.

The Use of the Line of Chords on the SECTOR.

1. To open the sector so as the two lines of chords may make an angle or number of degrees, suppose 40. Take the distance from the joint to 40, the number of the degrees proposed, on the line of chords; open the sector till the distance from 60 to 60, on each leg, be equal to the given distance of 40; then with the two lines on the sector form an angle of 40°, as was required.

2. The sector being opened, to find the degrees of its aperture. Take the extent from 60 to 60, and lay it off on the line of chords from the centre; the number whereon it terminates will shew the degrees, &c. required.

3. To lay off any number of degrees upon the circumference of a circle. Open the sector till the distance between 60 and 60 be equal to the radius of the given circle; then take the parallel extent of the chord of the number of degrees on each leg of the sector, and lay it off on the circumferences of the given circle. Hence any regular polygon may be easily inscribed in a given circle.

Use of the Line of Polygons on the SECTOR.

1. To inscribe a regular polygon to a given circle. Take the semi-diameter of the given circle in the compasses, and adjust it to the number 6, on the line of polygons, on each leg of the sector: then, the sector remaining thus opened, take the distance of the two equal numbers, expressing the number of sides the polygon is to have; e. gr. the distance from 5 to 5 for a pentagon, from 7 to 7 for a heptagon, &c. These distances carried about the circumference of the circle, will divide it into so many equal parts.

2. To describe a regular polygon, e. gr. a pentagon, on a given right line. Take the length of the line in the compasses, and apply it to the extent of the number 5, 5, on the lines of polygons. The sector thus opened, upon the same lines, take the extent, from 6 to 6; this will be the semi-diameter of the circle the polygon is to be inscribed in. If, then, with this distance, from the ends of the given line, you describe two arches of a circle, their intersection will be the centre of the circle.

3. On a right line, to describe an isosceles triangle, having the angle at the base double that at the vertex. Open the sector, till the ends of the given line fall on 10 and 10 on each leg; then take the distance from 6 to 6. This will be the length of the two equal sides of the triangle.

Use of the Lines of Sines, Tangents, and Secants on the SECTOR.

By the several lines disposed in the sector, we have scales to several radiuses; so that having a length or radius given, not exceeding the length of the sector when opened, we find the chord, sine, &c. thereto, e. gr. suppose the chord, sine, or tangent, of 10°, to a radius of 3 inches, required; make 3 inches the aperture, between 60 and 60, on the lines of chords of the two legs; then will the same extent reach from 45 to 45 on the line of tangents, and from 90 to 90 on the line of the sines on the other side; so that to whatever radius the line of chords is set, to the same are all the others set. In this disposition, therefore, if the aperture between 10 and 10, on the lines of chords, be taken with the compasses, it will give the chord of 10°. If the aperture of 10 and 10 be in like manner taken on the lines of sines, it will be the sine of 10°. Lastly, if the aperture of 10 and 10 be in like manner taken on the lines of tangents, it gives the tangent of 10°.

If the chord, or tangent, of 70° was required; for the chord, the aperture of half the arch, viz. 35, must be taken, as before; which distance, repeated twice, gives the chord of 70°. To find the tangent of 70° to the same radius, the small line of tangents must be used, the other only reaching to 45: making, therefore, 3 inches the aperture between 45 and 45 on the small line; the extent between 70 and 70° on the same, will be the tangent of 70° to 3 inches radius.

To find the secant of an arch, make the given radius the aperture between 0 and 0 on the line of secants: then will the aperture of 10 and 10, or 70 and 70, on the said lines, give the tangent of 10°, or 70.

If the converse of any of these things were required; that is, if the radius be required, to which a given line is the sine, tangent, or secant, it is but making the given line, if a chord, the aperture on the line of chords, between 10 and 10, and then the sector will stand at the radius required; that is, the aperture between 60 and 60, on the said line, is the radius. If the given line were a sine, tangent, or secant, it is but making it the aperture of the given number of degrees; then will the distance of 90 and 90 on the sines, of 45 and 45 on the tangents, of 0 and 0 on the secants, be the radius.

SECULAR, something that is temporal, in which sense

ſenſe the word ſtands oppoſed to eccleſiaſtical: thus we ſay, ſecular power, ſecular juriſdiction, &c.

Secular is more peculiarly uſed for a perſon who lives at liberty in the world, not ſhut up in a monaſtery nor bound by vows or ſubjected to the particular rules of any religious community; in which ſenſe it ſtands oppoſed to regular. The Romiſh clergy is divided into ſecular and regular.

SECULAR *Games, Ludi Seculares*, in antiquity, ſolemn games held among the Romans once in an age. Theſe games laſted three days and as many nights, during which time ſacrifices were performed, theatrical ſhews exhibited, with combats, ſports, &c. in the circus.

SECULAR *Poem, Carmen Seculare*, a poem ſung or rehearſed at the ſecular games, of which kind we have a very fine piece among the works of Horace, being a ſapphick ode at the end of his epodes.

SECULARIZATION, the act of converting a regular perſon, place, or benefice, into a ſecular one.

SECUNDINES, *Secundinæ, after Birth*, in anatomy, the ſeveral coats or membranes wherein the fœtus is wrapped up in the mother's womb, as the chorion and amnios, with the placenta, &c.

SEDANTIA, ſedative medicines, in pharmacy, ſuch medicines as are poſſeſſed of a power not only of compoſing, checking, and allaying the exorbitant and irregular motions of the ſolids and fluids, but alſo of alleviating and reſolving the painful ſpaſmodick ſtrictures of the parts. As the effects of theſe medicines are very extenſive, we may juſtly include in their number paregoricks, which not only relax and gently ſooth the rigid fibres, but alſo obtund the acrimony of the juices; anodynes, which alleviate the violence of racking pains; antiſpaſmodicks, which mitigate and remove the ſpaſmodick ſtrictures of the parts; antiepilepticks, which check convulſive motions; hypnoticks, which procure ſleep; and narcoticks, which induce a conſiderable ſtupor of the ſenſes and torpor of all the motions of the body.

SE DEFENDENDO, in law, a plea uſed for him that is charged with the death of another, by alledging that he was under a neceſſity of doing what he did in his own defence; as that the other aſſaulted him in ſuch a manner, that if he had not done what he did, he muſt have been in hazard of his own life. But here the danger muſt appear ſo great, as to be inevitable. Any perſon in his juſt defence may kill others for the ſafety of his life; though if malice be coloured under a pretence of neceſſity, or one kill another before he is under a neceſſity of ſo doing, the ſame may be either murder or manſlaughter by our law.

Where two perſons ſuddenly fall out, and one of them, being attacked, flies to the wall, or any unpaſſable place, as far as he can, in order to ſave his life, but being ſtill purſued, kills the perſon that attacked him; this killing, as well as others in the like caſes, is ſe defendendo. In ſe defendendo, though the affair juſtifies the killing to have been in his own defence, he is nevertheleſs obliged to ſue out his pardon from the lord chancellor, which of courſe is granted him, but yet his goods and chattels become forfeited to the king. It is ſaid, however, that upon the ſpecial matter found, he may be diſmiſſed without any forfeiture, &c.

SEDIMENT, the ſettlement or dregs of any thing, or that groſs heavy part of a fluid body which, upon reſting, ſinks to the bottom of the veſſel.

SEDUM, houſe-leek, in botany, a genus of plants, whoſe flower conſiſts of five plane, lanceolated, pointed petals, with five nectaria, each being a ſmall emarginated ſcale, and inſerted on the back of the germen; the fruit conſiſts of five erecto-patent, acuminated, compreſſed capſules, emarginated at the baſe, and opening from top to bottom; the ſeeds are numerous and ſmall. This genus includes the orpine and ſtone-crop. The common houſe-leek grows on the tops of old walls and houſes, it is evergreen, flowers in July, and the ſtalk withers in autumn. This plant is ſaid to be cooling, cleanſing, and aſtringent; and ſome give four ounces of the juice to cure intermittent fevers, when there is no cold fit: and the leaves are ſometimes uſed externally to cure the piles, but it muſt be done with caution.

SEED, *Semen*, in phyſiology, a ſubſtance prepared by nature, for the reproduction and conſervation of the ſpecies, both in animals and plants. The ſeed of animals, and particularly of mankind, is a whitiſh fluid, ſecreted from the blood in the teſtes. It is the thickeſt and moſt elaborated of all the humours in the human body; and by a chymical analyſis, is found to conſiſt almoſt entirely of oil and volatile ſalts blended with a little phlegm. The ſeminal liquor, however, ſuch as emitted for uſe, is a mixture of the true ſemen with the liquors of the proſtatæ, and other glands of the penis; all which, in the act of coition, are poured at the ſame time into the common canal of the urethra, either from the glands where they are ſecreted, or the reſervoirs where they are kept; and being there blended together, are injected into the uterus.

SEED, in botany, the product of a plant, whereby the ſpecies is propagated. The ſeed is frequently the fruit of the plant; ſometimes it is only a part incloſed in the fruit, &c.

Dr. Agricola tells us that there is incloſed in ſeeds a little germ or bud that compoſes the prime and moſt noble part of the whole; and, which, according as ſome curious perſons have calculated, hardly makes the thouſandth part of the ſeed; but, on this ſmall part, the image and repreſentation of the whole tree is perfectly delineated and expreſſed; and this principal part being any way hurt, ſpoiled, or loſt, the ſeed, however large, or otherwiſe perfect, will come to nothing, but will rot in the earth.

In Malpighi's Life, p. 67, a debate may be ſeen between him and ſignior Triumphetti, whether the whole plant be actually in the ſeed: the affirmative is maintained by Malpighi with cogent arguments.

And, as the perpetuity and ſafety of the ſpecies depend upon the ſafety of the ſeed and fruit in a great meaſure, nature hath taken peculiar care for the conſervation and ſafety thereof; as particularly in ſuch as dare to ſhew their heads all the year, how ſecurely is their flower, ſeed, or fruit, locked up all the winter, together with their leaves and branches, in their germs, and well fenced and covered there with neat and cloſe tunicks? And, for ſuch as dare not ſo expoſe themſelves, with what ſafety are they preſerved under the coverture of the earth, in their root, ſeed, or fruit, till invited out by the kindly warmth of the ſpring? And, when the whole vegetable race is thus called out, it is very curious to obſerve the methods of nature in guarding thoſe inſenſative creatures againſt harms and inconveniencies, by making ſome, for inſtance, to lie down proſtrate, and others to cloſe themſelves up upon the touch of animals; and the moſt to ſhut up their flowers, their down, or other their like guard, upon the cloſe or cool of the evening, for fear of rain, or other matters that may be prejudicial to the tender ſeed.

And to theſe conſiderations, relating to the ſeed, we might add the various ways of nature in diſſipating and ſowing it, ſome being, for this end, winged with light down or wings to be conveyed about by the winds; others being laid in elaſtick ſpringy caſes, that, when they burſt and crack, dart their ſeed at convenient diſtances, performing thereby the part of a good huſbandman; others, by their agreeable taſte and ſmell, and ſalutary nature, inviting themſelves to be ſwallowed, and carried about by the birds, and thereby alſo fertilized by paſſing through their bodies; and others, not thus taken care of, do many of them, by their uſefulneſs in human life, invite the huſbandman and gardener carefully to ſow and nurſe them up. Dr. Agricola ſays, the ſeeds of fruits, when ſeparated from them, though not kept in the earth, will live freſh and healthy a great many years by means of its intrinſick ſpirit; but, when it grows very old, it is unfit for vegetation.

But, notwithſtanding what ſome gardeners ſay, that ſome ſeeds are the better for being two or three years old; yet, he is of opinion that ſeed of one year old is beſt: for then the ſpirit is freſh and lively; the juices, which are the principle of nutrition and growth, are ſtill ſuſceptible of motion in the places of their reſidence; and the whole ſtructure in a good diſpoſition.

The vegetative principle will indeed remain longer in one ſeed than in another, and in the long and round ſeed longer than in the flat and ſmall ſeed; for that in the large and round ſeed, as well as in the oval, the juices circulate more freely by an interior motion, and have a greater circuit. And, beſides that the juices are in them in greater abundance than in thoſe that are ſmall and flat, they can neither evaporate or dry ſo ſoon.

But in thoſe ſeeds that are very old, the juices are conſumed and dried, and the organs are otherwiſe modified, and ſo the moving vegetative principle can act no longer for the fecundity of plants for the production of ſeeds.

Change of SEED. Seed-wheat ſhould be brought from the crop on a ſtrong clay land, whatever kind of land it is to be ſowed upon. A white clay is a good change for a red clay, and a red clay for a white; but whatever the land be, from which the ſeed is taken, it may be infected, if that be not changed there the preceding year; and then there may be danger, though it be had from ever ſo proper a land. It is a rule among the farmers, never to buy ſeed-wheat from a ſandy ſoil; they expreſs their diſlike of this by the coarſe rhyme. Sand is a change for no land.

SEEDLINGS, among gardeners, are young plants which have not been tranſplanted from the beds where they were ſown: it is alſo a term uſed to diſtinguiſh plants raiſed of the ſeeds from thoſe of the ſame kinds which have been propagated by layers, cuttings, &c.

SEEDY, in the brandy trade, a term uſed by the dealers, to denote a fault that is found in ſeveral parcels of French brandy, which renders them unſaleable. The French ſuppoſe that theſe brandies obtain the flavour which they expreſs by this name, from weeds that grow among the vines from whence the wine of which this brandy is made was preſſed. However it be, the thing is evident, and the taſte not of any one kind, ſome taſting ſtrongly of anniſeed, ſome of carraway ſeed, and ſome others of the ſtrong flavoured ſeeds of plants. The buſineſs of rectification of ſpirits, Dr. Shaw obſerves, is very little underſtood abroad, though much practiſed with us; and there is no doubt but that the ſame means which we uſe to rectify malt ſpirits, would alſo ſerve to purify theſe brandies.

SEEING, the act of perceiving objects by the organ of ſight; or it is the ſenſe we have of the external objects by means of the eye. See SIGHT.

SEELING, in the menage; a horſe is ſaid to ſeel when he begins to have white eye-brows, that is, when there grows on that part about the breadth of a farthing of white hairs, mixed with thoſe of his natural colour, which is a mark of old age. It is ſaid, that a horſe never ſeels till he is 14 years old, and always does before he is 16 years. The light, ſorrel, and black ſooner ſeel than any other. Horſe-jockies uſually pull out thoſe hairs with pincers; but if there be ſo many, that it cannot be done without making the horſe look bald and ugly, then they colour their eye-brows, that they may not appear old.

SEELING, at ſea, is uſed in the ſame ſenſe nearly with heeling; when a ſhip lies down conſtantly, or ſteadily on one ſide, the ſeamen ſay, ſhe heels; and they call it ſeeling when ſhe tumbles violently and ſuddenly, by reaſon of the ſea forſaking her, as they call it; that is, the waves leaving her for a time in a bowling ſea. When a ſhip thus tumbles to leeward, they call it leeſeel; and in this there is not much danger, even in a ſtorm, becauſe the ſea will eaſily right her up again; but if ſhe rowls or ſeels to windward, there is fear of her coming over too ſhort or ſuddenly, and ſo having the ſea break right into her, be either foundered, or have ſome of her upper works carried away.

SEGMENT *of a Circle*, in geometry, that part of the circle contained between a chord and an arch of the ſame circle. See CIRCLE.

SEGMENT *of a Sphere*, is a part of a ſphere terminated by a portion of its ſurface, and a plane which cuts it off, paſſing ſomewhere out of the centre; being more properly called the ſection of a ſphere. The baſe of ſuch a ſegment, it is evident, is always a circle for finding the ſolid contents of the ſegment of a ſphere.

SEGMENT is ſometimes alſo extended to the parts of the ellipſes, and other curvilinear figures.

SEGMOIDAL VALVES, in anatomy, little valves of the pulmonary artery, thus called from their reſembling ſegments of circles, but more uſually called ſemilunar valves.

SEIGNIORY, *Dominium*, in our law, is uſed for a manor or lordſhip of a ſeigneur, or lord of the fee or manor

SEIGNORAGE, ſignifies the right, or due belonging to a ſeigneur, or lord; but it is particularly uſed for a duty belonging to the prince, for the coining of money; called alſo coinage, which, under our ancient kings, was five ſhillings for every pound of gold brought in the maſs to be coined, and a ſhilling for every pound weight of ſilver. At preſent the king claims no ſeignorage at all, but the ſubject has his money coined at the publick expence; nor has the king any advantage therefrom, but what he has from the alloy.

SEISIN, in law, ſignifies poſſeſſion. Seiſin is divided into that in deed or in fact, and that in law; a ſeiſin in deed is where a poſſeſſion is actually taken; but a ſeiſin in law is, where lands deſcend, and the party has not entered thereon; or in other words, it is, where a perſon has a right to lands, &c. and is by wrong diſſeiſed of them.

SEIZE, SEAZE, or SEASE, in the ſea-language, is to make faſt, or bind, particularly to faſten two ropes together with rope-yarn. The ſeizing of a boat is a rope tied to a ring, or little chain in the foreſhip of the boat, by which means it is faſtened to the ſide of the ſhip.

SEIZURE, in commerce, an arreſt of ſome merchandize, moveable, or other matter, either in conſequence of ſome law, or of ſome expreſs order of the ſovereign. Contraband goods, thoſe fraudulently entered, or landed without entering at all, or at wrong places, are ſubject to ſeizure. In ſeizures, among us, one half goes to the informer, and the other half to the king.

SELENDERS, in the menage, are chaps, or mangy ſores, in the bending of a horſe's hough, as the malanders are in the knees.

SELENOGRAPHY, a branch of coſmography, which deſcribes the moon and all the parts and appearances thereof, as geography does thoſe of the earth.

SELEUCIDÆ, in chronology, Æra of the Seleucidæ, or the Syro-Macedonian æra, is a computation of time, commencing from the eſtabliſhment of the Seleucidæ, a race of Greek kings, who reigned as ſucceſſors of Alexander the Great, in Syria, as the Ptolemies did in Egypt. This æra we find expreſſed in the book of the Maccabees, and on a great number of Greek medals, ſtruck by the cities of Syria, &c. The rabbins call it the æra of contracts; and the Arabs, therik dilkarnain, that is, the æra of the two horns. According to the beſt accounts, the firſt year of this æra falls in the year 311 before Chriſt, being twelve years after Alexander's death.

SELL, in building, is of two kinds, viz. groundſell, which denotes the loweſt piece of timber in a timber-building; and that on which the whole ſuperſtructure is raiſed: and the window-ſell, called alſo windowſoil, is the bottom piece in a window frame.

SEMETS, SUMMETS, or SUMMITS, in botany, the ſame with the antheræ. See ANTHERÆ.

SEMI, a word borrowed from the Latin, ſignifying *half*, but only uſed in compoſition with other words, as in the following articles.

SEMI-ARIANS, in church hiſtory, a branch of the ancient Arians, conſiſting of ſuch as in appearance condemned the errors of that hereſiarch, but yet acquieſced in ſome of the principles thereof, only palliating and concealing them under ſofter and more moderate terms.

SEMI-CIRCLE, in geometry, half a circle, or that figure comprehended between the diameter of a circle and half the circumference.

SEMI-CIRCLE, is alſo a ſurveying inſtrument, conſiſting of a ſemi circular limb as FIG (*Plate* LXXII. *fig.* 4.) divided into 180 degrees, and ſometimes ſubdivided into minutes. This limb is ſubtended by the diameter F G, at the extremities whereof are erected two ſights. In the centre of the ſemi-circle is fixed a box and needle, and on the ſame centre is fixed a moveable index, carrying two ſights, as H, I. The whole is mounted on a ſtaff with a ball and ſocket. This inſtrument is only half a theodolite, and its uſe nearly the ſame.

SEMI-COLON, in grammar, one of the points or ſtops uſed to diſtinguiſh the ſeveral members of ſentences from each other. It is marked thus (;) See POINTING.

SEMI-CUPIUM, a half-bath, in which the parts below the navel only are immerſed.

SEMI-DIAMETER, the ſame with radius, or a right line drawn from the centre of a circle or ſphere to its circumference.

SEMI-DIAPENTE, in muſick, a falſe or defective fifth, called by the Italians falſa quinta.

Semi-Diapason, a defective octave; or that lessoned by a semi-tone.

Semi-Diatessaron, a defective or false fourth.

Semi-Lunar *Valves*, the same with Segmoidal *Valves*, which see.

SEMINAL, spermatick, or something belonging to the seed.

SEMINALIS, *Capsula*, in botany, the seed-bag or husks that contain the seed of any plant.

SEMINATION, in agriculture, &c. the act of sowing or shedding seed, particularly that of vegetables.

SEMI-NERVOSUS, half nervous, in anatomy, a muscle that ariseth from the protuberance of the ischium, and is inserted by a round tendon into the internal part of the epiphysis of the tibia, and helps to bend the leg.

SEMI-ORDINATES, the half of the ordinates or applicates.

SEMI-QUARTILE, an aspect of the planets, when distant from each other 45°, or one sign and a half.

SEMI-QUAVER, in musick, the half of the quaver.

SEMI-QUINTILE, an aspect of the planets, when at the distance of 36° from each other.

SEMI-SEXTILE, an aspect added by Kepler, wherein the planets are 30°, or one twelfth part of a circle from each other.

SEMISPINALIS, or Semispinosus, in anatomy, one of the extensor muscles of the back and loins, has its origin from the os sacrum and vertebræ of the loins, and its termination at the upper vertebræ of the thorax, especially at the spinose apophyses; it coheres very firmly to the longissimus dorsi and sacro lumbaris, the other two extensors of the back and loins.

SEMITA Luminosa, a name given to a lucid tract in the heavens, which may be seen about six o'clock at night, a little before the vernal equinox, extending from the western edge of the horizon up towards the pleiades. Cassini thinks this phænomenon arises from a vast number of small planets encompassing the sun, which gives this light from reflection.

SENA, in pharmacy, &c. a leaf brought to us dried and picked off the stalks, but often with many of the fragments of the stalks, and even the seed vessels of the tree among it. It is of an oblong figure, broadest in the middle, and terminating in a sharp point at the end opposite to where it grows to the stalk; it is somewhat thick and flattish, of a pale green colour, with somewhat of a yellowish cast, and of a firm texture. Its smell is faintish but not disagreeable, its taste subacid, bitterish, and nauseous. We have two kinds of sena, the Alexandrian and that of Tripoly; these are easily distinguished by the Tripoly kind having more obtuse points, being also larger, of a finer green, and somewhat rough to the touch. We also sometimes meet with a third kind, which is the Mocha sena; this is distinguished by its leaf being narrower, longer, and sharper-pointed than even the Alexandrian kind; and finally we sometimes meet with the Italian sena; this is easily distinguished from all the rest by the leaf being large, broad, and rounded at the end, and having the ribs standing high upon it; all these three kinds are greatly inferior in virtue to the Alexandrian, which should always therefore be chosen.

The first care in the buying it is to be assured from the shape of the leaf that it is of this kind, and it must then be seen that it be fresh and of a good smell, soft to the touch, and cleared from stalks. The leaves ought also to be entire, and of a yellowish green colour, not spotted with black; and finally, on infusion, it should give a light colour to the water. The pods that come over among the leaves of sena are also used by some in medicine; they are said to be preferable even to the leaves themselves; they are membranaceous, flat seed vessels, of an oblong, considerably broad, and crooked figure, and of a dusky green colour; they contain flatted seeds of a deep blackish colour in some, and paler in others, according to the different maturity of the different drying.

Sena, in whatever form, is one of the best purges. It is apt however to gripe, if given without correctives; those most in use for this purpose are coriander, aniseed, ginger, raisins, and salt of tartar. These are occasionally added to the infusion according to the nature of the case and circumstances of the patient; but there is no corrective so effectual as the diluting it with a large quantity of the liquid its infusion is taken in. Instead of a dose of it being confined to two or three ounces of liquor, if it be given in a quart, and a large quantity of broth or some other fatty liquor drank after it, it hardly gripes at all.

SENATE, *Senatus*, an assembly, or council of senators; that is, of the principal inhabitants of a state, who have a share in the government.

SENATOR, a member of the senate.

SENATUS-CONSULTUM, a vote or resolution of the Roman senate, pronounced on some question or point of law proposed to it.

SENECIO, groundsel, in botany, a genus of plants, which includes the jacobæa of Tournefort. The common groundsel is emollient and resolvent, and taken in a strong infusion, proves emetick: it is prescribed in small doses in the jaundice, dropsy, and hæmorrhages; and externally, it is used in ointments for disorders of the skin.

SENNAT, among sailors, a sort of braided cordage formed by the platting of five, seven, or nine rope yarns into one another; it is employed for various uses in a ship, particularly to form netting, &c.

SENSATION, the act of perceiving external objects, by means of the organs of sense. To conceive the manner wherein sensation is affected, observe, that all the organs consist of little filaments, or nerves, which have their origin in the middle of the brain, are diffused thence throughout all the members which have any sense, and terminate in the exterior parts of the body; that when we are in health, and awake, one end of these nerves cannot be agitated nor shaken, without shaking the other, by reason they are always a little stretched: as in the case of an extended chord, one part of which cannot be stirred without a like motion of all the rest.

It is to be likewise observed, that these nerves may be agitated two ways, either at the end out of the brain, or that in the brain. If they be agitated from without, by the action of objects, and their agitation be not communicated as far as the brain; as frequently happens in sleep, when the nerves are in a state of relaxation; the soul does not then receive any new sensation. But if the nerves happen to be agitated in the brain, by the flux of the animal spirits, or any other cause; the soul perceives something, through the parts of those nerves, that are out of the brain, diffused through the several parts of the body, remain at perfect rest: as likewise is frequently the case in sleep.

Lastly, observe, that experience tells us, we may sometimes feel pain in parts of the body that have been entirely cut off, by reason of the fibres in the brain corresponding to them being agitated in the same manner as if they were really hurt; the soul feels a real pain in those imaginary parts.

SENSE, a faculty of the soul, whereby it perceives external objects, by means of the impressions they make on certain organs of the body.

The organs of sensation are generally reckoned five, viz. the eye, whereby we see objects; the ear, which enables us to hear sounds; the nose, by which we receive the ideas of different smells; the palate, by which we judge of tastes; and the cutis, or skin, which enables us to feel the different forms, hardness, or softness of bodies. See the articles Eye, Ear, &c. as also Vision, Hearing, &c.

SENSITIVE Soul, a denomination given to the souls of brutes, either as intimating its utmost faculty to be that of sensation; or because it is supposed to be corporeal, so as to be an object of our senses. See Soul.

Sensitive, or Sensible Plant. See Mimosa.

SENSORY, *Sensorium Commune*, the seat of the common sense, or what receives the impressions of all sensible objects, conveyed to it by the nerves of each particular organ, and consequently is the immediate cause of perception. This office is, by Dr. Willis, attributed to the striated part of the brain; and by Des Cartes, to the glandula pinealis.

SENTENCE, in law, a judgment passed in court by the judge, on some process, either civil or criminal.

Sentence, in grammar, a period or set of words, comprehending some perfect sense or sentiment of the mind.

Sentence, in poetry, is an instructive and lively remark made on something very observable and agreeably surprising, which contains much sense in a few words.

It

It is either direct or plain, as, "In all the affairs of "the world, so much reputation is really so much power:" or indirect or disguised, as,

"Fool, not to think how vain
"Against th' Omnipotent to rise in arms."

SENTIMENTS, in poetry, and especially dramatick, are the thoughts which the several persons express, whether they relate to matters of opinion, passion, business, or the like.

SENTINEL, CENTINEL, or CENTRY, in military affairs, is a private soldier, placed in some post, to watch any approach of the enemy, to prevent surprises, and to stop such as would pass without order, or discovering who they are.

SEPARATISTS, an appellation given to dissenters, from their separating from the established church.

SEPTEMBER, the ninth month of the year, consisting only of 30 days: it took its name as being the seventh month, reckoning from March, with which the Romans began their year.

SEPTENTRIO, in astronomy, a constellation more usually called ursa minor. See URSA.

In cosmography, the term septentrio denotes the same with north: and hence, septentrional is applied to any thing belonging to the north, as septentrional signs, parallels, &c.

SEPTUAGESIMA, in the calendar, denotes the third Sunday before Lent, or before quadragesima Sunday: supposed by some to take its name from its being about 70 days before Easter.

SEPTUAGINT, the name given to a Greek version of the books of the Old Testament, from its being supposed to be performed by 72 Jews, who are usually called the 70 interpreters, because 70 is a round number.

The history of this version is expressly written by Aristeas, an officer of the guards to Ptolemy Philadelphus; the substance of whose account is as follows: Ptolemy having erected a fine library at Alexandria, which he took care to fill with the most curious and valuable books from all parts of the world, was informed that the Jews had one, containing the laws of Moses, and the history of that people, and being desirous of enriching his library with a Greek translation of it, applied to the high priest of the Jews; and to engage him to comply with his request, set at liberty all the Jews, whom his father Ptolemy Soter had reduced to slavery. After such a step, he easily obtained what he desired; Eleazar, the Jewish high priest, sent back his ambassadors with an exact copy of the Mosaical law, written in letters of gold, and six elders of each tribe, in all 72, who were received with marks of respect by the king, and then conducted into the isle of Pharos, where they were lodged in a house prepared for their reception, and supplied with every thing necessary in abundance. They set about the translation without loss of time, and finished it in 72 days; and the whole being read in the presence of the king, he admired the profound wisdom of the law of Moses; and sent back the deputies, laden with presents for themselves, the high priest, and the temple.

We shall subjoin M. Rollin's reflection on this translation of the Bible into Greek. "This version, which made the scriptures intelligible to an infinite number of people, was one of the most considerable fruits of the Grecian conquests: and it appears plainly to have been a part of the principal design, which God had in delivering all the East into the hands of the Greeks, and supporting them therein, notwithstanding the divisions, jealousies, battles, and the frequent revolutions that happened among them. God by this means prepared an easy way for the preaching of the gospel, which was near at hand, and more readily united so many nations, different both in language and manners, in one society, in the same worship, and in the same doctrine, by one language, the most elegant, copious, and correct, that was in the world, and which became common to all the countries conquered by Alexander."

SEPTUM, in anatomy, an inclosure, or partition; a term applied to several parts of the body, which serve to separate one part from another.

SEPULCHRAL, something belonging to sepulchres, or tombs.

SEPULCHRE, a tomb, or place destined for the interment of the dead. This term is chiefly used in speaking of the burying-places of the ancients, those of the moderns being usually called tombs.

SEQUEL, in logick, the same with conclusion. See CONCLUSION.

SEQUESTRATION, in common law, is setting aside the thing in controversy from the possession of both the parties that contend for it. In which sense it is either voluntary, as when done by the consent of the parties; or necessary, as where it is done by the judge, of his own authority, whether the parties will or not.

SEQUIN, a gold coin, struck at Venice, and in several parts of the grand seignior's dominions. See COIN.

SERAGLIO, a Persian word, which signifies the palace of a prince or lord, in which sense the house of the ambassadors of England, France, &c. are, at Constantinople, called their seraglios. But the term seraglio is used, by way of eminence, for the palace of the grand seignior at Constantinople, where he keeps his court, in which his concubines are lodged, and where the youth are trained up for the principal posts of the empire.

SERAPH, or SERAPHIM, a spirit of the highest rank in the hierarchy of angels; who are thus called, from their being supposed to be the most inflamed with divine love, by their nearer and more immediate attendance at the throne of God, and to communicate their fervour to the remoter and inferior orders. See ANGEL.

SERAPHICK, burning or inflamed with love or zeal, like a seraphim: thus St. Bonaventure is called the seraphick doctor, from his abundant zeal and fervour.

SERENADE, a kind of concert given in the night, by a lover to his mistress, under her window.

SERENE, a title of honour given to several princes, and to the principal magistrates of a republick.

SERGE, in commerce, a woollen stuff manufactured in a loom, of which there are various kinds, denominated either from their different qualities, or from the places where they are wrought; the most considerable of which is the London serge, which is highly valued abroad, and of which a manufacture has been for some years carried on in France.

SERGEANT, or SERJEANT *at Law*, or *of the Coif*, is the highest degree taken at the common law, as that of doctor is of the civil law; and as these are supposed to be most learned and experienced in the practice of the courts, there is one court appointed for them to plead in by themselves, which is the Common-Pleas, where the common law of England is most strictly observed: but they are not restrained from pleading in any other court, where the judges, who cannot have that honour till they have taken the degree of serjeant at law, call them brothers.

These serjeants are created by the king's writ, commanding them to take upon them that degree therein assigned, under a great penalty: and one or more of these is stiled the king's serjeant, who is chosen out of the rest to plead for him in all causes, more especially those of treason, &c.

SERGEANT *at Arms*, or *Mace*, an officer appointed to attend the person of the king, to arrest traitors, and such persons of quality as offend; and to attend the lord high steward when sitting in judgment on a traitor.

The number of these officers is by statute limited to that of 30: there are now eight at court, who are created with great ceremony; for the person kneeling before the king, his majesty lays the mace on his right shoulder, and says, "Rise up, serjeant of arms, and esquire, for ever." They attend in the presence chamber, where the band of gentlemen pensioners wait; and receiving the king at the door, they carry the maces before him, when he goes to chapel, or the house of lords.

There are four other serjeants at arms created in the same manner; one of whom attends the lord chancellor; a second, the lord treasurer; a third, the speaker of the house of commons; and a fourth, the lord mayor of London, on solemn occasions. There is also an inferior kind of serjeants at mace, who attend the mayor, or the head officer of corporations.

SERGEANT, or SERJEANT, in war, is an inferior officer in a company of foot, or troop of dragoons, armed with an halbard, and appointed to see discipline observed, to teach the soldiers the exercise of their arms, and to order, straiten, and form ranks, files, &c.

SERGEANTY, or SERJEANTY, in law, is taken for a ſervice that cannot be due from a tenant to any other lord beſides the king.

SERIES, in general, denotes a continued ſucceſſion of things in the ſame order, and having the ſame relation or connection with each other: in this ſenſe we ſay, a ſeries of emperors, kings, biſhops, &c.

In natural hiſtory, a ſeries is uſed for an order or ſubdiviſion of ſome claſs of natural bodies; comprehending all ſuch as are diſtinguiſhed from the other bodies of that claſs, by certain characters, which they poſſeſs in common, and which the reſt of the bodies of that claſs have not.

SERIES, in mathematicks, is a number of terms, whether of numbers or quantities, increaſing or decreaſing in a given proportion; the doctrine of which has already been given under the article PROGRESSION.

Infinite SERIES, is a ſeries conſiſting of an infinite number of terms; that is, to the end of which it is impoſſible ever to come; ſo that the ſeries being carried on to any aſſignable length, or number of terms, it canbe carried yet further, without end or limitation. See INFINITE.

A number actually infinite, that is, all whoſe units can be actually aſſigned, and yet is without limits, is a plain contradiction to our ideas about numbers; for whatever number we can conceive, or have any proper idea of, is always determinate and finite; ſo that a greater after it may be aſſigned, and a greater after this; and ſo on, without a poſſibility of ever coming to an end of the addition or increaſe of numbers aſſignable; which inexhauſtibility, or endleſs progreſſion in the nature of numbers, is all we can diſtinctly underſtand by the infinity of number; and therefore to ſay that the number of any thing is infinite, is not ſaying, that we comprehend their number, but indeed the contrary: the only thing poſitive in this propoſition being this, that the number of theſe things is greater than any other number which we can actually conceive and aſſign. But then, whether in things that do really exiſt, it can be truly ſaid, that their number is greater than any aſſignable number; or, which is the ſame thing, that in the numeration of their units one after another, it is impoſſible ever to come to an end; this is a queſtion about which there are different opinions, with which we have no buſineſs in this place; for all that we are concerned here to know, is this certain truth, that after one determinate number, we can conceive a greater, and after this a greater, and ſo on without end. And therefore, whether the number of any things that do or can really exiſt all at once, can be ſuch that it exceeds any determinable number, or not, this is true, that of things which exiſt, or are produced ſucceſſively one after another, the number may be greater than any aſſignable one; becauſe though the number of things thus produced, that does actually exiſt, at any time, is finite, yet it may be encreaſed without end. And this is the diſtinct and true notion of the infinity of a ſeries; that is, of the infinity of the number of its terms, as it is expreſſed in the definition.

Hence it is plain, that we cannot apply to an infinite ſeries the common notion of a ſum, viz. a collection of ſeveral particular numbers that are joined and added together one after another, for this ſuppoſes that theſe particulars are all known and determined; whereas the terms of an infinite ſeries cannot be all ſeparately aſſigned, there being no end in the numeration of its parts, and therefore it can have no ſum in ſenſe. But again, if we conſider that the idea of an infinite ſeries conſiſts of two parts, viz. the idea of ſomething poſitive and determined, in ſo far as we conceive the ſeries to be actually carried on; and the idea of an inexhauſtible remainder ſtill behind, or an endleſs addition of terms that can be made to it one after another; which is as different from the idea of a finite ſeries as two things can be: hence we may conceive it as a whole of its own kind, which therefore may be ſaid to have a total value, whether that be determinable or not. Now in ſome infinite ſeries this value is finite or limited; that is, a number is aſſignable beyond which the ſum of no aſſignable number of terms of the ſeries can ever reach, nor indeed ever be equal to it, yet it may approach to it in ſuch a manner, as to want leſs than any aſſignable difference; and this we may call the value or ſum of the ſeries; not as being a number found by the common method of addition, but as being ſuch a limitation of the value of the ſeries, taken in all its infinite capacity, that if it were poſſible to add them all one after another, the ſum would be equal to this number.

Again, in other ſeries the value has no limitation; and we may expreſs this, by ſaying, the ſum of the ſeries is infinitely great; which indeed ſignifies no more than that it has no determinate and aſſignable value; and, that the ſeries may be carried ſuch a length as its ſum, ſo far, ſhall be greater than any given number. In ſhort, in the firſt caſe we affirm there is a ſum, yet not a ſum taken in the common ſenſe; in the other caſe we plainly deny a determinate ſum in any ſenſe.

Theorem I. In an infinite ſeries of numbers, increaſing by an equal difference or ratio (that is, an arithmetical or geometrical encreaſing progreſſion) from a given number, a term may be found greater than any aſſignable number. Hence, if the ſeries encreaſe by differences that continually encreaſe, or by ratios that continually encreaſe, comparing each term to the preceding, it is manifeſt that the ſame thing may be true, as if the differences or ratios continued equal.

Theorem II. In a ſeries decreaſing in infinitum in a given ratio, we can find a term leſs than any aſſignable fraction.

Hence, if the terms decreaſe, ſo as the ratios of each term to the preceding do alſo continually decreaſe, then the ſame thing is alſo true, as when they continue equal.

Theorem III. The ſum of an infinite ſeries of numbers all equal, or encreaſing continually, by whatever differences or ratios, is infinitely great; that is, ſuch a ſeries has no determinate ſum, but grows ſo as to exceed any aſſignable number.

Demonſ. 1. If the terms are all equal, as $A : A : A$, &c. then the ſum of any finite number of them is the product of A by that number, as $A\,n$; but the greater n is, the greater is $A\,n$; and we can take n greater than any aſſignable number; therefore $A\,n$ will be ſtill greater than any aſſignable number,

Secondly, Suppoſe the ſeries encreaſes continually (whether it do ſo infinitely or limitedly) then its ſum muſt be infinitely great, becauſe it would be ſo if the terms continued all equal, and therefore will be more ſo, ſince they encreaſe. But if we ſuppoſe the ſeries increaſes infinitely, either by equal ratios or differences, or by encreaſing differences or ratios of each term to the preceding; then the reaſon of the ſums being infinite will appear from the firſt theorem; for in ſuch a ſeries, a term can be found greater than any aſſignable number and much more therefore the ſum of that and all the preceding.

Theorem IV. The ſum of an infinite ſeries of numbers decreaſing in the ſame ratio, is a finite number, equal to the quote ariſing from the diviſion of the product of the ratio and firſt term, by the ratio leſs by unity; that is, the ſum of no aſſignable number of terms of the ſeries can ever be equal to that quote; and yet no number leſs than it, is equal to the value of the ſeries, or to what we can actually determine in it; ſo that we can carry the ſeries ſo far, that the ſum ſhall want of this quote leſs than any aſſignable difference.

Demonſ. 2. To whatever aſſigned number of terms the ſeries is carried, it is ſo far finite; and if the greateſt term is l, the leaſt A, and the ratio r, then the ſum is $S = \frac{r\,l - A}{r-1}$. See *Geometrical* PROGRESSION.

Now, in a decreaſing ſeries from l, the more terms we actually raiſe, the laſt of them, A becomes the leſſer, and the leſſer A be $r\,l - A$ is the greater, and ſo alſo is $\frac{r\,l - A}{r-1}$; but $r\,l - A$ being ſtill leſs than $r\,l$, therefore $\frac{r\,l - A}{r-1}$ is ſtill leſs than $\frac{r\,l}{r-1}$, that is, the ſum of any aſſignable number of the terms of the ſeries is ſtill leſs than the quote mentioned, which is $\frac{r\,l}{r-1}$, and this is the firſt part of the theorem.

Again, the ſeries may be actually continued ſo far, that $\frac{r\,l - A}{r-A}$ ſhall want of $\frac{r\,l}{r-1}$, leſs than any aſſignable difference; for, as the ſeries goes on, A becomes leſs and leſs in a certain ratio, and ſo the ſeries may be actually continued till A becomes leſs than any aſſignable number (by Theorem II.) now $\frac{r\,l}{r-1} - \frac{r\,l - A}{r-1} = \frac{A}{r-1}$,

and $\frac{A}{r-1}$ is lefs than A; therefore let any number affigned be called N, we can carry the feries fo far till the laft term A be lefs than N; and becaufe $\frac{rl-A}{r-1}$ wants of $\frac{rl}{r-1}$, the difference $\frac{A}{r-1}$, which is lefs than A, which is alfo lefs than N, therefore the fecond part of the theorem is alfo true, and $\frac{rl}{r-1}$ is the true value of the feries.

Scholium. The fenfe in which $\frac{rl}{r-1}$ is called the fum of the feries, has been fufficiently explained; to which, however, we fhall add this: that whatever confequences follow from the fuppofition of $\frac{rl}{r-1}$ being the true and adequate value of the feries taken in all its infinite capacity, as if the whole were actually determined and added together, can never be the occafion of any affignable error in any operation or demonftration where it is ufed in that fenfe; becaufe, if it is faid that it exceeds that adequate value, yet it is demonftrated that this excefs muft be lefs than any affignable difference, which is in effect no difference, and fo the confequent error will be in effect no error: for if any error can happen from $\frac{rl}{r-1}$ being greater than it ought to be, to reprefent the complete value of the infinite feries, that error depends upon the excefs of $\frac{rl}{r-1}$ over that complete value; but this excefs being unaffignable, that confequent error muft be fo too; becaufe ftill the lefs the excefs is, the lefs will the error be that depends upon it. And for this reafon, we may juftly enough look upon $\frac{rl}{r-1}$ as expreffing the adequate value of the infinite feries. But we are further fatisfied of the reafonablenefs of this, by finding in fact, that a finite quantity does actually convert into an infinite feries, which happens in the cafe of infinite decimals. For example, $\frac{2}{3} = .6666$, &c. which is plainly a geometrical feries from $\frac{6}{10}$ in the continual ratio of 10 to 1: for it is $\frac{6}{10} + \frac{6}{100} + \frac{6}{1000} + \frac{6}{10000}$, &c. And reverfely, if we take this feries, and find its fum by the preceding theorem, it comes to the fame $\frac{2}{3}$; for $l = \frac{6}{10}$, $r = 10$, therefore $rl = \frac{60}{10} = 6$; and $r-1 = 9$, whence $\frac{rl}{r-1} = \frac{6}{9} = \frac{2}{3}$.

Theorem V. In the arithmetick progreffion 1, 2, 3, 4, &c. the fum is to the product of the laft term, by the number of terms, that is, to the fquare of the laft term; in a ratio always greater than 1 : 2, but approaching infinitely near it. But if the arithmetical feries begins with 0, thus, 0, 1, 2, 3, 4, &c. then the fum is to the product of the laft term, by the number of terms, exactly in every ftep as 1 to 2.

Theorem VI. Take the natural progreffion, beginning with 0, thus, 0, 1, 2, 3, &c. and take the fquares of any the like powers of the former feries; as the fquares 0, 1, 4, 9, &c. or cubes, 0, 1, 8, 27; and then again take the fum of the feries of powers to any number of terms, and alfo multiply the laft of the terms fummed by the number of terms (reckoning always 4 for the firft term) the ratio of that fum, to that product is more than $\frac{1}{n \times 1}$ (n being the index of the powers) that is, in the feries of fquares it is more than $\frac{1}{3}$; in the cubes more than $\frac{1}{4}$; and fo on: but the feries going on in infinitum, we take in more and more terms without end into the fum; and the more we take, the ratio of the fum to the product mentioned, grows lefs and lefs; yet fo far as it never can actually be equal to $\frac{1}{n \times 1}$ but approaches infinitely near to it, or within lefs than an affignable difference.

SERMONES, the title Horace gives to his Satires.

SERMONS, orations, or difcourfes delivered by the clergy of the Chriftian church, in their religious affemblies.

SERON, in commerce, a certain quantity of fome particular commodities. Thus a feron of almonds is 200 weight; of anife feeds, from 300 to 400; of Caftile foap, from 200 and a half to 300 and three quarters.

SEROSITY, in medicine, denotes an over-abundance of ferum. See SERUM and BLOOD.

SERPENS, in aftronomy, a conftellation in the northern hemifphere, called more particularly Serpens Ophiuchi. The ftars in the conftellation Serpens, in Ptolemy's catalogue, are 17; in Tycho's, 19; in the Britannick catalogue, 59.

SERPENT, *Serpens*, in zoology, the name of a genus of animals, which Mr. Ray defines to be creatures breathing by means of lungs, having only one ventricle in the heart, having no feet, and having a long body, covered with fcales. To which he adds, that in cold feafons they can bear hunger a long time. The greater part of the ferpent clafs are poifonous, and dangerous in their bite, leaving a mifchievous liquor in the wound, made by their tooth, which, mixing by this means immediately with the blood, is of fatal confequence; though the whole creature may be eaten with fafety, or even the poifonous liquor, which does this mifchief in the wounded, tafted without hurt.

Notwithftanding that ferpents refpire by means of lungs, they do not take in and difcharge their breath by fuch fhort intervals as other animals, but what they have once infpired will ferve them a long time; for as they are of a cold nature, and therefore their neceffary warmth very fmall, they do not require fuch an externally renewed fupply of that pabulum of vital heat, as thofe which have more of it; and as with us they lie half the year torpid, and half dead, their vital warmth at that time, like fire fmothered under afhes, barely exifts, and needs perhaps no more air than what the creature took in at one infpiration, before its laying itfelf down for the feafon, which ferves it till the life-renewing fpring returns.

Serpents, according to Mr. Ray, may be divided into the poifonous and the harmlefs; the firft having long dentes exerti, with poifonous liquors contained at their bottom, which, on biting, they difcharge into the wound: the others wanting thefe teeth, and this poifon. They may alfo be divided, in regard to their generation, into the oviparous and viviparous; but this is a lefs firmly founded diftinction than may be fuppofed fince all ferpents are truly and properly produced of eggs; and the only difference is, that fome depofit their eggs in dunghills, and the like places, to be hatched by accidental heat, while others retain thofe eggs to be hatched in their own bodies, and fo bring forth living young ones. Of the firft kind is the common fnake, of the latter the viper.

SERPENTARIA VIRGINIANA, *Virginian Snakeroot*, a medicinal root of a very fingular figure, not long and thick, or tuberous and roundifh, as moft of the other roots of the fhops, but wholly made up, as it were, of fibres, or is compofed of a multitude of long and thin filaments, arranged in clufters together; they are about the bignefs of a fmall packthread each, and are of a fmooth furface, a tolerable tough and firm texture, very light and eafily cut or powdered; they are of a dufky brownifh colour on the outfide, and when frefh and good, have a yellowifh caft within; they are of a remarkable fmell, fomething approaching to that of zedoary, and are of a bitterifh and fubacrid tafte. Snake-root is frequently met with fophifticated, or adulterated with the roots of the plant called Virginian afarum, or black fnake-root; but this is eafily difcovered, the roots of that plant being black: thefe are the roots of the afarum Virginianum, piftolochiæ folio fubrotundo, cyclaminis more maculato, of Plunket. This plant is a true fpecies of afarabacca, and its roots, though they fomewhat refemble thofe of the Virginian fnake-root in tafte and fmell, are by no means to be confounded with it, or ufed in its place. This is the only adulteration of any confequence, in regard to this drug. We often fee it differ, indeed, a little in appearance between one parcel and another, but this is not material: we know that there are the roots of two or three fpecies of the fame genus of plants, fent to us indifcriminately under this name; but, as they all poffefs the fame virtues, the thing is of no confequence.

This root was firft brought into ufe as a remedy againft venomous bites, it being affirmed to us, that the bite of the rattle-fnake was to be cured by it; however much truth there may be in that, there is no doubt but it is a

very noble medicine. It is diuretick, diaphoretick, and alexipharmick: it is even recommended as a cure for the bite of a mad dog, but it is not ſafe to truſt to ſo uncertain remedies in ſuch terrible caſes. It is certainly good in fevers, in hyſterick complaints, and againſt worms; it is given in powder or tincture; its doſe is from 4 to 10 or 15 grains; it is alſo, ſometimes, made an ingredient in decoctions, a drachm or two to the pint. It is not an ingredient in any of the officinal compoſitions; but our late diſpenſatory orders a tincture of it to be kept in the ſhops, made by digeſting three ounces of the root in a quart of proof ſpirit, and, after three days ſtanding without heat, the tincture is to be filtred off for uſe.

SERPENTARIUS, in aſtronomy, a conſtellation of the northern hemiſphere, called alſo Ophiuchus. The ſtars in this conſtellation, in Ptolemy's catalogue, are 29, in Tycho's 25, and in Mr. Flamſtead's 69.

SERPENTINE Verses, ſuch as begin and end with the ſame word.

Serpentine, in chymiſtry, a worm or pipe of pewter or copper, twiſted into a ſpiral, and placed into a veſſel filled with water, ſerving as a refrigeratory to condenſe the vapour in diſtillation.

SERPIGO, in medicine, a kind of herpes, popularly called a tetter or ring-worm. See Herpes. It conſiſts of a number of very ſmall puſtules, riſing cloſe to each other, ſometimes in a circular form, with great pain and itching. It never comes to digeſtion, and is not cured without difficulty. For after it appears to have been quite extinguiſhed, it frequently breaks forth again at certain ſeaſons of the year. The common people uſe to anoint it with ink: but where the diſeaſe is fixed, ſome univerſals ſhould be firſt applied.

SERRATED, in general, ſomething indented or notched, in the manner of a ſaw; a term much uſed by botaniſts in the deſcription of the leaves of plants.

SERRATUS, in anatomy, a name given to ſeveral muſcles from their reſemblance to a ſaw.

SERVANT, a term of relation, ſignifying a perſon who owes and pays a limited obedience, for a certain time, to another in quality of maſter.

If any ſervant, who is hired for a year, depart before the end of his term, without reaſonable cauſe, to be allowed by a juſtice of the peace; or, after the term is expired, without giving a quarter's warning, he is liable to be committed to priſon by two juſtices, till he gives ſecurity to ſerve out the time: or he may, by one juſtice, be ſent to the houſe of correction, there to be puniſhed as a diſorderly perſon, 7 Jac. I. c. 4.

On the other hand, a maſter cannot put away his ſervant before the end of the term he was hired for, without ſome reaſonable cauſe allowed by a juſtice of the peace; nor after the expiration of the term, without a quarter's warning given, on pain of forfeiting 40s. Where a ſervant that is hired for a year happens to fall ſick, ſuch ſervant ought not to be diſcharged, nor his wages abated on that account.

SERVETISTS, a name given to the modern Antitrinitarians, from their being ſuppoſed to be the followers of Michael Servetus, who, in the year 1559, was burnt at Geneva, together with his books.

SERVICE, in law, is a duty which a tenant, on account of his fee, owes to his lord.

Service-Tree, *Sorbus*, in botany. See Sorbus.

SERVITES, a religious order in the church of Rome, founded about the year 1233, by ſeven Florentine merchants, who, with the approbation of the biſhop of Florence, renounced the world, and lived together in a religious community on mount Senar, two leagues from that city.

SERVITOR, in the univerſity of Oxford, a ſtudent who attends on another for his maintenance and learning.

SERUM, a thin, tranſparent, ſaltiſh liquor, which makes a conſiderable part in the maſs of blood. See Blood.

SESAMOIDA Ossa, in anatomy, ſeveral ſmall bones that ſomewhat reſemble the ſeed of the ſeſamum, whence their name.

SESAMUM, in botany, a genus of the didynamia angio-ſpermia claſs. The calix conſiſts of five ſegments; the corolla is campanulated, with five ſegments; the ſtigma is lanceolated; and the capſule has four cells. There are two ſpecies, both natives of India. The ſeeds of this plant, upon expreſſion, yield a larger quantity of oil than almoſt any other known vegetable; among the Indians, they are uſed as food.

SESELI-*Seed*, in the materia medica, the name of a ſeed of a plant, called alſo by ſome libanotis, and growing three or four feet high, with leaves like fennel, but of a paler green. It is a native of warm climates. The ſeed ſhould be choſen moderately large, of a longiſh ſhape, heavy, clean, and of a greeniſh colour, freſh, and of a grateful ſmell. It affords, by diſtillation, a very large quantity of an eſſential oil, and is hot and dry. It incides, opens, and diſcuſſes, and is cephalick, neurotick, pectoral, nephritick. It is good againſt epilepſies, apoplexies, vertigoes, and all diſorders of the head and nerves.

SESQUI, a Latin particle, ſignifying a whole and a half, which joined with *altera*, *terza*, *quarta*, &c. is much uſed in the Italian muſick, to expreſs a kind of ratios, particularly ſeveral ſpecies of triples.

Sesqui-Alteral *Proportion*, in geometry and arithmetick, is when any number or quantity contains another once and a half; and the number ſo contained in the greater, is ſaid to be to it in ſubſeſqui-alteral proportion.

Sesqui-Duplicate *Proportion*, is when of two terms the greater contains the leſs twice, with half another over.

Sesqui-Quadrate, an aſpect or poſition of the planets, when they are at the diſtance of four ſigns and a half, or 135° from each other; and ſeſqui-quintile is an aſpect of the planets when they are 180° from each other.

Sesqui-Tertional *Proportion*, is when any number or quantity contains another once and one-third.

SESSILE Roots, among botaniſts, ſuch tuberous roots as adhere to the baſe of the ſtalk. And a ſeſſile leaf expreſſes a leaf immediately fixed to the ſtalk or root, without any pedicle.

SESSION, *Seſſio*, in general, denotes each ſitting or aſſembly of a council, &c.

SESTERCE, *Seſtertius*, a ſilver coin in uſe among the Romans, being ſomething more than ſeven farthings ſterling.

SET, or Sets, a term uſed by farmers and gardeners, to expreſs the young plants of the white-thorn and other ſhrubs, with which they uſe to raiſe their quick or quick-ſet hedges.

SETHIANS, in church hiſtory, Chriſtian hereticks, ſo called, becauſe they paid divine worſhip to Seth, whom they looked upon to be Jeſus Chriſt the Son of God, but who was made by a third Divinity, and ſubſtituted in the room of the two families of Abel and Cain, which had been deſtroyed by the deluge.

Theſe hereticks appeared in Egypt in the ſecond century; and as they were addicted to all ſorts of debauchery, they did not want for followers, and continued in Egypt above 200 years.

SETON, in ſurgery, a few horſe-hairs, ſmall threads, or large packthread, drawn through the ſkin, chiefly the neck, by means of a large needle or probe, with a view to reſtore or preſerve health.

We find by experience, that ſetons are very uſeful in the hydrocephalus, catarrhs, inflammations, and other diſorders, particularly thoſe of the eyes, as a gutta ſerena, cataract, and incipient ſuffuſion; to thoſe we may add intenſe head-achs, with ſtupidity, drowſineſs, epilepſies, and even an apoplexy itſelf.

SETTER, among farmers. To ſetter is to cut the dewlap of an ox or cow, and into the wound to put the root of the helleboraſter, whereby an iſſue is made for ill humours to vent themſelves.

SETTING, in aſtronomy, the withdrawing of a ſtar or planet, or its ſinking below the horizon.

SEVENTH, *Septima*, in muſick, an interval, whereof there are four kinds. The firſt, the diminiſhed or defective ſeventh, conſiſting of three tones and three greater ſemi-tones. The ſecond, called by the Italians ſettimo minore, is compoſed diatonically of ſeven degrees and ſix intervals, four whereof are tones, and the reſt greater ſemi-tones; and, chromatically, of 10 ſemi-tones, ſix whereof are greater, and four leſs. The third, called by the Italians il ditono con diapente, is compoſed diatonically, like the former, of ſeven degrees and ſix intervals, ſix whereof are full tones, and the other a greater ſemi-

femi-tone; fo that only one femi-tone is wanting of the octave; and, chromatically, of 11 femi-tones, fix whereof are greater, and five lefs. The fourth, called the redundant feventh, is compofed of five tones, a greater femi-tone, and a lefs; fo that it wants only the difference between the lefs and greater femi-tone of an octave.

SEWER, in the houfhold, an officer who comes in before the meat of a king or nobleman, to place and range it on the table.

Sewer, in building, a drain, conduit, or conveyance for the fuillage and filth of a houfe.

SEX, *Sexus*, fomething in the body, which diftinguifhes male from female.

SEXAGENARY, fomething relating to the number 60.

Sexagenary, or *Sexagefimal Arithmetick*, a method of computation proceeding by fixties; fuch as is ufed in the divifion of a degree into 60 minutes, of a minute into 60 feconds, of a fecond into 60 thirds, &c.

SEXAGESIMA, the fecond Sunday before Lent; fo called, becaufe near 60 days before Eafter.

SEXAGESIMAL. See Sexagenary.

SEXAGESIMALS, or Sexagesimal *Fractions*, are fractions whofe denominations are in a fexagecuple ratio; that is, a prime $= \frac{1}{60}$, a fecond $= \frac{1}{3600}$, a third $= \frac{1}{216000}$, &c.

SEXTANS, the fixth part of a pound, among the ancient Romans. It alfo fignified the fixth part of any other weight or meafure.

SEXTANT, in geometry, the fixth part of a circle, or an arch containing 60°.

Sextant, is alfo the name of a mathematical inftrument, whofe limb contains 60°.

SEXTILE, an afpect of the planets when they are two figns, or 60° diftant from each other.

SEXTUPLE, in mufick, a mixed fort of triple time, which is beaten in double time.

SHADOW, in opticks, a privation of light by the interpofition of an opaque body. But as nothing is feen but by a light, a mere fhadow is invifible. When therefore we fay we fee a fhadow, it is partly that we fee bodies placed in the fhadow, and illuminated by light, reflected from collateral bodies, and partly that we fee the confines of light.

If the opaque body, that projects the fhadow, be perpendicular to the horizon, and the place it is projected on be horizontal, the fhadow is called a right fhadow: fuch are the fhadows of men, trees, buildings, mountains, &c. If the opaque body be placed parallel to the horizon, the fhadow is called a verfed fhadow; as the arms of a man ftretched out, &c.

Shadow, in painting, is an imitation of a real fhadow, effected by gradually heightening and darkening the colours of fuch figures, as, by their difpofition, cannot receive any direct rays from the luminous object which is fuppofed to enlighten the piece.

Of Shadows *from the Sun.* The fun being vaftly larger than the whole globe of the earth, muft give all its fhadows pointed, by reafon it illumines more than half of them.

In confequence of this demonftration, we might conclude, that all the fun's fhadows muft be lefs than the bodies that project them, and diminifhed more and more as they recede further and further.

Now this would be true, were there any relation between the body illumined and the body illumining; but as all objects on the earth are fo fmall in comparifon, the diminution of their fhadows is imperceptible to the eye, which fees them always equal, i. e. either broader or narrower than the body that forms them: on this account, all the fhadows caufed by the fun are made in parallels.

From the whole it appears, that, to find the fhadow of any body whatever oppofed to the fun, a line muft be drawn from the top of the luminary perpendicular to the place where the foot of the luminary is to be taken; and through this place an occult line to be drawn through one of the angles of the plane of the object, and another from the fun to the fame angle; and the interfection of the two lines will fhew how far the fhadow is to go: all the other lines muft be drawn parallel hereto.

The fhadows of the fun are equal in objects of the fame height, though at a diftance from each other.

Experience teaches that feveral ftiles or elevations of the fame height, removed to a diftance from each other, do yet project equal fhadows at the fame time: for they are lengthening and fhortening, in proportion as the fun comes nearer, or recedes further off; one or other of which he is continually doing.

For this reafon, when the fhadow of an object is to be caft any way, you muft determine the place of the fun, and the point underneath, to draw two occult lines from the fame, for the extremity of the fhadow; as here the palifade A (*plate* LXXII. *fig.* 5.) gives the extreme of its fhadow in B; and if from this point B you draw a line to the point of fight C, this line B C will be the fhadow of the palifade D, as well as that of A, and of all the reft, in the fame line, to the very point of fight.

In effect, it muft be held for a certain maxim, that fhadows always retain the fame point of fight as the objects.

On the footing of this obfervation, that objects of the fame height give equal fhadows; if you would give the fhadow of the palifades E, F, which are of the fame height as A, D; take in your compaffes the diftance A B, and fet it on the foot of the palifade E, by which you will have E G; then from G draw a line to the point of fight C, and thus you are to proceed, though the walks were infinite.

Though the fun is made to appear in this figure, it muft not be imagined that he is fo near the objects. The intention was to fhew, that the rays proceed from him, when at fuch a height, though far without the limits of the piece.

As in (*plate* LXXII. *fig.* 6.) which yet has the line, for the foot of the object A B, and that of the rays of the fun C; by reafon that thofe are always required for finding the extremities of the fhadows.

The fhadow of the object O is found by continuing the line A B, and making it rife over the fteps, and againft the wall, till cut by the ray in the point S, by the rays paffing over the corner of the object, and from S drawing a line to the point of fight T.

To find the fhadow of the object P, it muft be remembered that the foot of the light muft always be fuppofed on the plane, where the object is placed. Accordingly, the ray C, cutting the little line A B, fhews how far the fhadow of the little object P muft go, to be thence drawn to the point of fight T. The object V cafts its fhadow all along, though in its way it defcends into a ditch.

The fhadow of the wall R is found by the fame rule as the reft; as appears from the lines A B, and the ray C.

Shadows *on feveral parallel Planes.* The firft plane here is the floor, whereon the chair A (*plate* LXXII. *fig.* 7.) ftands; the fecond plane is the upper part of the table, parallel to the firft, and may be either above or below it.

There might alfo be more of thefe planes, wherein to find the foot of the illuminating body, in order to come at the fhadow of the object.

Suppofe the foot of the illuminating body to be C, and the flame B; from the points C and B draw lines, through the upper and under parts of the object D, which will give the fhadow E upon the table.

To find the fhadow of the chair A, which is placed on the ground, determine the foot of the luminary on the table in C on the ground; this is eafy by the following inftructions.

From the point of diftance, which is here fuppofed to be without the limits of the paper, draw a line through the foot of the table F; then from the angle G upon the table let fall a perpendicular, cutting the line F in the point H, and from H draw a parallel to the bafe H I, which is equal to the upper part of the table, and will direct to the thing required.

For drawing a line from the point of fight K, through the foot of the luminary C, to the extremity of the table L; from the fame point L, let fall a perpendicular to H I, which will give the point M.

Then from M draw a line to the point of fight K, in which line M K will the foot of the luminary be found.

To determine the precife point, let fall a perpendicular from the point C, which, cutting the line M K, will give the point N for the foot of the luminary.

This point N being thus found, there will be no difficulty in finding the fhadow of the chair A; the method

thod being the ſame as for the other objects taught before, that is, from the foot of the luminary N draw lines through all the angles of the plane of the chair, and other lines through the upper part of the chair from the luminary B; theſe latter, by interſecting the former, expreſs the bounds of the ſhadow. For the reſt, the figure gives ſufficient directions.

SHADOWS *by Torch-light.* The ſhadow of an erect pyramid by torch-light falls, as it would by the light of the ſun; and in both caſes there is but one line, whereon the vertical point of the pyramid will be found.

Upon the planes B C D E (*fig.* 8.) draw the diagonals E B and D C; through the central point E, raiſe the perpendicular F A; and from the four points B C D E draw lines to the point A, and the pyramid will be erected.

Then, to find its ſhadow, draw an indefinite line from the baſis G of the illuminating body, paſſing through F; and from the central flame of the torch of H draw another line over the vertex of the pyramid in the line G F, till it cut the point I, which point will limit the ſhadow of the pyramid.

Laſtly, draw a line from C to I, and another from E to I, and the triangle C I E will be the ſhadow of the pyramid.

To gain the ſhadow of an inverted pyramid, draw perpendicular lines from the angular points of its baſe, and form the ſubjacent plane, by means thereof, after the manner directed for the ſun.

And from all the angles of this plane draw lines to the baſe of the torch G; then from H, the central point of the flame, draw other lines touching all the angles of the baſe of the inverted pyramid, and dividing thoſe of the plane, whereby the ſhadow will be defined.

The different diſpoſitions and height of SHADOWS *by torch-light.* Shadows from the ſun are all caſt the ſame way, and have the ſame diſpoſition; it being impoſſible, that the ſun ſhould occaſion one ſhadow to tend towards the eaſt, and another towards the weſt, at the ſame time.

It is true, in different times of the day, it makes this difference; but never in one and the ſame hour.

But the torch, candle, and lamp, have always this effect; for in what place ſoever one of theſe luminaries be found, provided there be a number of objects about, the ſhadows will be caſt various ways; ſome to the eaſt, ſome to the weſt, ſome to the north, and others to the ſouth, according to the ſituation of the objects around the luminary: the foot of which here repreſented by A (*fig.* 9.) ſerves as a common centre, from which they all proceed: and the flame here repreſented by B ſhews where they are to terminate, though at different diſtances; as the neareſt produce the ſhorteſt ſhadows, and the remoteſt the longeſt.

SHAFT *of a Column*, in architecture, is the body thereof; ſo called from its ſtraightneſs.

SHAFT *of a Mine*, the hollow entrance or paſſage into a mine, ſunk or dug, to come to the ore. See MINE.

SHAGREEN, or CHAGREEN, a kind of grained leather, chiefly uſed in the covers of caſes, books, &c. It is very cloſe and ſolid, and covered with little roundiſh grains or papillæ. It is brought from Conſtantinople, Taurus, Tripoli, Algiers, and ſome parts of Poland.

Authors are not agreed what the animal is whence the ſhagreen is prepared. Ongar tells us it is the onager, a kind of wild aſs. Borel ſays it is a ſea-calf; others, a kind of fiſh called ſhagreen by the Turks.

SHAMMY, or CHAMMY, *Chamois*, a kind of leather, either dreſſed in oil or tanned; much eſteemed for its ſoftneſs, pliancy, &c.

It is prepared from the ſkin of the chamois, or ſhamo's, a kind of wild-goat, inhabiting the mountains of Dauphine, Savoy, Piedmont, and the Pyreneans.

SHANKER, in ſurgery, a malignant ulcer, which corrodes the fleſh; uſually occaſioned by ſome venereal diſtemper.

SHARP, in muſick, marked thus (※), which, being prefixed to a note, ſhews that it is to be ſung, or played, a ſemi tone higher than the note would have been without.

SHEATHING *of a Ship*, the caſing that part of her hull which is under water, with ſomething to keep the worms from eating into her planks. It is uſually done by laying tar and hair all over the old plank, and then nailing on very thin boards.

SHEEP, *Ovis*, in zoology, a well known ſpecies of cattle, and which are kept at the leaſt expence of any to the farmer. They will thrive upon almoſt any ground, and for that reaſon are preferred by many before the larger cattle.

The beſt ſort of ſheep for fine wool are thoſe bred in Herefordſhire and Worceſterſhire, but they are ſmall and black-faced, and bear but a ſmall quantity.

Warwick, Leiceſterſhire, Buckingham, and Northamptonſhire breed a large-boned ſheep, of the beſt ſhape, and deepeſt wool we have got. The marſhes of Lincolnſhire breed a very large kind of ſheep, but their wool is not good, unleſs the breed be mended by bringing in ſheep of other countries among them, which is a ſcheme of late very profitably followed there.

The northern counties in general breed ſheep with long, but hairy wool: and Wales breeds a ſmall hardy kind of ſheep which has the beſt taſted fleſh, but the worſt wool of all.

The farmer ſhould always buy his ſheep from a worſe land than his own, and they ſhould be big-boned, and have a long greaſy wool, curling cloſe and well. Theſe ſheep always breed the fineſt wool, and alſo are the moſt approved of by the butcher for ſale in the market.

SHEERING, or SHEARING, in the woollen manufactory, is the cutting off, with large ſheers, the ſuperfluous nap or ſhag, found on the ſurface of woollen ſtuffs, &c.

SHEERING, is alſo a ſea term, for the motion of the ſhip, when ſhe does not move in a ſtraight line, but traverſes, or moves, in and out.

SHEKEL, or SHEKLE, an ancient Hebrew coin, equal to 2*s.* 3*d.* ¼ ſterling.

SHELF, among miners, that hard ſurface or ſtratum of the earth, which lies under the mould, uſually about a foot deep.

SHELL, in natural hiſtory, a hard, and as it were ſtony covering, with which certain animals are defended, and thence called ſhell-fiſh.

As to the formation of a ſhell, it is now generally allowed to be formed by a viſcous fluid compoſed of glue, and ſeveral ſandy particles of an exquiſite fineneſs, which are tranſmitted through an infinite number of little channels to the pores where it tranſpires, condenſes, and hardens. When the animal increaſes in bulk, and the extremity of her body is not ſufficiently covered, it continues to evacuate and build in the ſame manner, finiſhing or repairing her habitation. This viſcous matter is proved, by undeniable experiments, to ariſe from the body of animals, and not from the ſhell, as ſome have imagined.

Foſſile SHELLS, thoſe found buried at great depths in earth, and often immerſed in the hardeſt ſtones. Theſe foſſile ſhells, as well as thoſe found lying on the ſea-ſhore, make an excellent manure, eſpecially for cold clayey lands; upon which it does not produce nearly ſo great an effect for the two firſt years, as it does in the ſucceeding ones; the reaſon of which is, that it is not then ſufficiently mixed, but in ſucceeding time it breaks itſelf into a number of very ſmall particles, and theſe all become intimately blended with the molecules of earth, and produce their effect more properly.

SHELL-FISH, a collective name for all the fiſh naturally incloſed in ſhells.

SHELTIE, a ſmall but ſtrong kind of horſe, ſo called from Shetland, or Zetland, where they are produced.

SHEPHERDS-NEEDLE, *Scandix*, in botany. See SCANDIX.

SHEPHERDS-POUCH, *Burſa Paſtoris*, in botany, an annual plant which grows naturally in many parts of England. Its juice is very aſtringent and glutinous; it ſtops bleeding at the noſe, is good againſt ſpitting of blood, and in diarrhœa's, dyſenteries, and bloody urine. The doſe, in infuſion, is a handful; of the juice, four ounces; and of the powder of the dried leaves, a drachm.

SHERIFF, or SHIRE-REVE, an officer in each county of England, whoſe buſineſs is to ſee the king's orders executed, particularly all writs directed to him out of the king's courts; to impannel juries; bring cauſes and criminals to trial; take care that all affairs, both civil and criminal, are diſpatched; collect the revenues, impoſts, fines, confiſcations, &c. ariſing in his county, for which

which he accounts to the exchequer; and to attend and assist the itinerant judges.

SHEILD, an ancient weapon of defence, in form of a light buckler, borne on the arm as a defence against lances, darts, &c.

SHIELD, in heraldry, denotes the escutcheon or field, whereon the bearings of an armoury are placed.

SHILLING, an English silver coin, equal to twelve pence, or the twentieth part of a pound.

SHINGLES, or SHIDES, in building, small pieces of wood, in form of a wedge, about an inch thick at one end, four or five inches broad, and eight or nine inches long. They are used in covering, especially churches and steeples, instead of tiles and slates.

SHINGLES, in medicine, a kind of herpes, consisting of innumerable little pustules, breaking out in various parts of the body. See ERYSIPELAS.

SHIP, a general name for all large vessels with sails, fit for navigation on the sea, excepting gallies, which go with oars and smack sails.

All ships, at their first appearance in the world, were of the same form, whatever uses they were designed for; but the various ends of navigation, some of which were better answered by one form, some by another, soon gave occasion to build and fit out ships, not only different in bigness, but also in their construction and rigging. But it would be needless, as well as endless, to enumerate every little alteration. They were chiefly of three sorts; ships of burden, of war, and of passage.

In the northern parts of the world, the art advanced towards perfection, but by slow degrees; for when Cæsar invaded Britain, we find that the inhabitants opposed him in vessels of an odd form, or rather large tubs; the sails were composed of leather, and iron chains supplied the place of cable. When the Saxons had for some time been settled in this island, they became sensible that the best defence was a powerful navy. Accordingly, they applied themselves vigorously to build ships of war; and some historians tell us, that, in the reign of Edgar, the fleet amounted to 2600 sail. And, in order to keep the navy in a formidable condition, Ethelred made a law, "that whoever possessed 310 hide of land, should build "and mann one ship for the defence of his country."

But, though the Britons were not the first inventors of ship-building, the art owes, in a great measure, its present perfection to their discoveries; and, accordingly,

The navy of England excels all others in beauty, strength, and safety; for beauty, our ships of war are so many floating palaces; for strength, so many moving castles; and for safety, they are the most defensive walls of the land. And as our naval power gains us authority in the most distant nations, so the superiority of our fleet renders the British monarch master of the sea.

Trade first gave occasion to the fitting out large fleets of ships; and upon the increase of trade, ships of war became necessary in all nations to preserve it to the just proprietors.

SHIVERS, or SHEEVERS, in the sea language, names given to the little rollers or round wheels of pulleys. See PULLEY.

SHOAD, among miners, denotes a train of metalline stones, serving to direct them in the discovery of mines. See MINE.

SHOAL, in the sea language, denotes a place where the water is shallow.

SHOE *for an Anchor*, in a ship, the place for the anchor to rest, and fitted to receive the stock, &c. so as to prevent the sheets, tacks, and other running-rigging, from galling, or being entangled with the stocks.

SHOOTING. See GUNNERY and the article PROJECTILES."

SHORE, or SHOAR, a place washed by the sea, or some large river.

SHORT-HAND WRITING, when well understood, and rendered familiar by practice, is attended with many valuable consequences. See TACHYGRAPHY.

SHORT-SIGHTEDNESS, *Myopia*, in medicine. See MYOPIA.

SHOT, a denomination given to all sorts of balls for fire-arms, those for cannon being of iron, and those for guns, pistols, &c. of lead.

Indian SHOT, *Canna*, in botany. See CANNA.

SHOVELER, in ornithology, a species of the anas, with the extremity of the beak broad and round, and its ungues bent.

SHOULDER-BONE, *Humerus*, in anatomy. See HUMERUS.

SHOULDER-BLADE, *Scapula*, See SCAPULA.

SHOULDER-PITCHED, among farriers, is said of a horse whose shoulder is displaced which may be remedied by swimming the horse a dozen times up and down in deep water.

SHOULDER-SPLAIT, is when a horse's shoulder is parted from the breast.

SHOULDERING PIECE, among builders, the same with a bracket. See BRACKET.

SHOWER, in meteorology, a cloud resolving into rain. See RAIN.

SHRIMP, in ichthyology, the English name of two different species of the squilla, viz. the common shrimp, and smooth-nosed shrimp.

SHRINE, in ecclesiastical history, a case or box, to hold the relicks of some saint. See RELICKS and SAINT.

SHRITE, in ornithology, the same with the missel-bird.

SHROVE-TUESDAY, is the Tuesday after quinquagesima Sunday, or the day immediately preceding the first of Lent; being so called from the Saxon word ꞅꞃıꝼ, which signifies *to confess*, as having been employed by the people, in time of popery, in confessing their sins, in order to receive the sacrament, and thereby qualify themselves for a more religious observation of Lent.

SHROWDING *of Trees*, the cutting or lopping off the top branches; it is only practised on those trees which are designed for fuel, or some present use, not being fit for timber.

SHRUB, *Frutex*, a woody plant, of a size less than a tree, and which, besides its principal stem and branches, from the same root, puts forth several other considerable sets or stems.

SHUTTLE, in the manufactures, an instrument used by the weavers, which with the thread it contains, either of woollen, silk, flax, or other matters, serves to form the woofs of stuffs, cloths, linens, ribbands, &c. by throwing the shuttle alternately from right to left, and from left to right, across between the threads of the warp, which are stretched out lengthwise on the loom.

SI, in musick, a seventh note lately added by Le Maire to the six ancient notes invented by Guido Aretin, by means of which the difficulty attending the ancient scale is avoided.

SIBYLS, *Sybillæ*, in pagan antiquity, certain women, said to have been endued with a prophetick spirit, and to have delivered oracles foreshewing the fates and revolutions of kingdoms. We have in the writings of the ancients mention made of ten of them, the eldest of whom being named Sibylla, all the rest of the same sex, who afterwards pretended to the like fatidical spirit, were called from her Sibyls. The most eminent of the ten, mentioned in history, was she whom the Romans called Sibylla Cumæa, or Erythræa. She was born at Erythræ in Ionia, from whence she removed to Cumæ in Italy, and there delivered all her oracles from a cave or subterraneous vault dug out of the main rock.

SIEGE, in the art of war, the encampment of an army round a place, in order to take it, either by formal attacks, or famine.

The word is French, and literally signifies a seat.

The method of encamping is very different in a siege, from that observed on a march; as in the former the army environs the place without cannon-shot, that nothing may enter. If the place be situated on a river, a detachment is sent to the other side, and bridges of communication made both above and below the town. The army also encamp with their backs to the town, with the battalions and squadrons interlined; and, having taken possession of all the heights, whence the enemy may be annoyed, the engineers trace the lines of circumvallation and contravallation, every regiment working at the place appointed them.

When the general has disposed his guards, as well towards the place as towards the country, and established the lieutenant-generals to command in the particular quarters, he goes with the engineers to view the place, and orders the attack in the place judged the weakest.

To form a siege, there must be an army sufficient to furnish five or six reliefs for the trenches, pioneers, guards, &c.

&c. alſo artillery, and magazines furniſhed with a ſufficient quantity of ammunition and proviſions; and an hoſpital for taking care of the wounded.

To raiſe a ſiege, is to give over attacking a place, ordering the works and poſts before it to be levelled.

SIGHT, or VISION, in opticks. See the articles EYE and VISION.

SIGHTS, in mathematicks, imply two thin pieces of braſs, &c. placed perpendicularly on the two extremities of the index of a theodolite, circumferentor, &c. each of which has an aperture or ſlit in the middle, through which the viſual rays paſs to the eye, and diſtant objects are ſeen.

SIGILATA TERRA, a name given to ſeveral earths or boles, to ſignify their being genuine; the principal is that dug in the iſland Lemnos.

SIGMOIDES, a word uſed by medicinal writers to expreſs any thing that is in the ſhape of the letter ſigma.

SIGN, a ſenſible mark or character, denoting ſomething abſent or inviſible.

SIGN, in algebra. See CHARACTER.

SIGN, in medicine, implies ſome appearance in the body, diſtinguiſhable by the ſenſes, whence, by juſt reaſoning, is inferred the preſence, nature, ſtate, event of health, a diſeaſe, or death.

SIGN, in aſtronomy, the twelfth part of the ecliptick, or a portion containing thirty degrees thereof.

The ancients divided the ecliptick into twelve ſegments, called ſigns, which they denominated from the conſtellations, which, at the time the names were impoſed, were ſituated near thoſe portions of the ecliptick. But the conſtellations, by the preceſſion of the equinox, have changed their places, the conſtellation Aries being got into the ſign Taurus, and the conſtellation Taurus into the ſign Gemini, &c. The names and order of the twelve ſigns are as follow: Aries, ♈; Taurus, ♉; Gemini, ♊; Cancer, ♋; Leo, ♌; Virgo, ♍; Libra, ♎; Scorpio, ♏; Sagittarius, ♐; Capricornus, ♑; Aquarius, ♒; and Piſces, ♓: the firſt ſix of which are called northern ſigns, and the latter ſouthern ſigns.

SIGN-*Manual*, the ſetting one's hand and ſeal to a writing.

SIGN-*Manuel*, in law, is uſed to ſignify any bill or writing, ſigned by the king's own hand.

SIGNAL, a certain ſign agreed upon for the conveying of intelligence, where the voice cannot reach.

Signals are given for the beginning of a battle, or an attack, uſually with drums and trumpets; at ſea they are given by firing guns, by lights, ſails, flags, &c.

SIGNATURE, ſigning, a ſubſcription, or the putting one's name at the bottom of an act, or deed, in one's own hand-writing.

SIGNATURE, in printing, implies a mark at the bottom of each ſheet, to facilitate the gathering and binding of the book, and to ſhew the order and number of the quires and ſheets.

SIGNET, one of the king's ſeals, uſed for ſealing his private letters, and ſigning all grants which paſs his majeſty's hand by bill.

SIGNIFICATION, the meaning or import of a word, phraſe, ſign, device, emblem, or the like.

SIGNIFICATION, in law, is the notification of an act, &c. made to the oppoſite party, &c. by a copy, &c. thereof, given and atteſted by a proper officer.

SILENI, in antiquity, a ſort of heathen-demi-gods, the ſame with ſatyrs, which were called Sileni when they came to be advanced in age.

SILIQUA, in botany, the ſeed-veſſel, huſk, pod, or ſhell of a plant of the leguminous kind.

SILIQUOUS PLANTS, thoſe which produce ſiliquæ, or ſeed-pods.

SILK, *Sericum*, a very ſoft, fine, bright, delicate thread, the work of an inſect called bombyx, or the ſilk-worm.

In the year 555, two monks brought from the E. Indies to Conſtantinople great quantities of ſilk-worms, with inſtructions for the hatching their eggs, rearing and feeding the worms, drawing out the ſilk, ſpinning and working it. Immediately manufactures were ſet up at Athens, Thebes and Corinth. About 1130, Roger, king of Sicily, eſtabliſhed a ſilk manufactory at Palermo, and another in Calabria, managed by workmen whom he brought from Athens, Corinth, &c. which that prince had conquered in his expedition to the Holy Land. By degrees the reſt of Italy and Spain learned, from the Sicilians and Calabrians, the management of the ſilk-worms, and the working of ſilk; and at length, a little before the reign of Francis I. France began to imitate them.

The great advantage flowing from this new manufacture, made our king James I. to be very deſirous of its being introduced into England; accordingly it was recommended ſeveral times from the throne, and in the moſt earneſt terms, to plant mulberry-trees, &c. for the propagation of ſilk-worms, but unhappily without effect; though from the various experiments inſerted in the Philoſophical Tranſactions, and other places, it appears, that the ſilk-worm thrives, and works as well, in all reſpects, in England, as in any other part of Europe.

The ſilk-worm is an inſect not more remarkable for the precious matter it furniſhes for divers ſtuffs, than for the many forms it aſſumes, before and after its being enveloped in the rich cod or ball it weaves itſelf. From a ſmall egg about the ſize of a pin's head, which is its firſt ſtate, it becomes a pretty big worm, or maggot, of a whitiſh colour, inclining to yellow. In this ſtate it feeds on mulberry leaves, till, being come to maturity, it winds itſelf up in a ſilken bag, or caſe, about the ſize and ſhape of a pigeon's egg, and becomes metamorphoſed into an aurelia: in this ſtate it remains without any ſigns of life, or motion; till at length it awakes, to become a butterfly, after making itſelf a paſſage out of its ſilken ſepulchre. And, at laſt, dying indeed, it prepares itſelf, by an egg, or ſeed it caſts, for a new life, which the warmth of the ſummer-weather aſſiſts it in reſuming.

As ſoon as the ſilk-worm is arrived at the ſize and ſtrength neceſſary for beginning his cod, he makes his web; for it is thus they call that ſlight tiſſue, which is the beginning and ground of this admirable work. This is his firſt day's employment. On the ſecond, he forms his folliculus or ball, and covers himſelf almoſt over with ſilk. The third day he is quite hid, and the following day employs himſelf in thickening and ſtrengthening his ball, always working from one ſingle end, which he never breaks by his own fault, and which is ſo fine, and ſo long, that thoſe who have examined it attentively, think they ſpeak within compaſs, when they affirm, that each ball contains ſilk enough to reach the length of ſix Engliſh miles.

In ten days time the ball is in its perfection, and is now to be taken down from the branches of the mulberry-tree, where the worms have hung it. But this point requires a deal of attention, for there are ſome worms more lazy than others, and it is very dangerous waiting till they make themſelves a paſſage, which uſually happens about the fifteenth day of the month.

The firſt, fineſt, and ſtrongeſt balls, are kept for the grain, the reſt are carefully wound, or if it is deſired to keep them all, or if there be more than can be well wound at once, they lay them for ſome time in an oven moderately hot, or elſe expoſe them, for ſeveral days ſucceſſively, to the greateſt heats of the ſun, in order to kill the inſect, which, without this precaution, would not fail to open itſelf a way to go and uſe thoſe new wings abroad it has acquired within.

Ordinarily, they only wind the more perfect balls; thoſe that are double, or too weak, or too coarſe, are laid aſide, not as altogether uſeleſs, but that, being improper for winding, they are reſerved to be drawn out into ſkains. The balls are of different colours; the moſt common are yellow, orange-colour, iſabella, and fleſh-colour; there are ſome alſo of a ſea-green, others of a ſulphur-colour, and others white; but there is no neceſſity for ſeparating the colours and ſhades to wind apart, as all the colours are to be loſt in the future ſcouring and preparing of the ſilk.

Spider SILK. In the year 1710, Mr. Bonn diſcovered a method of procuring and preparing ſilk of the webs of ſpiders, and uſing it in ſeveral manufactures.

After the death of Mr. Bonn, the French academy appointed the celebrated Reaumur to make a further enquiry into this new ſilk-work, who has raiſed ſeveral objections and difficulties againſt it, which are inſerted in the memoirs of the academy for the year 1710. The ſum of what he has urged amounts to this: the natural fierceneſs of the ſpiders renders them unfit to be bred and kept together: four or five thouſand being diſtributed into cells, 50 in ſome, 100 or 200 in others; the big one's kill

kill and eat the leſs, ſo that in a ſhort time there were left only one or two in each cell: and to this inclination of mutually eating one another Mr. Reaumur aſcribes the ſcarcity of ſpiders, conſidering the vaſt number of eggs they lay.

But this is not all: he even affirms, that the ſpider's bag is inferior to that of the ſilk-worm, both in luſtre and ſtrength; and that it produces leſs matter to be manufactured. The thread of the ſpider's web only bears a weight of two grains without breaking; that of the bag bears 36. The latter, therefore, in all probability, is 18 times thicker than the former; yet is it weaker than that of the ſilk-worm, which bears a weight of two drachms and a half. So that five threads of the ſpider's bag muſt be put together to equal one thread of the ſilk-worm's bag.

Now, it is impoſſible theſe ſhould be applied ſo juſtly over one another, as not to leave little vacant ſpaces between them, whence the light will not be reflected; and, of conſequence, a thread, thus compounded, muſt fall ſhort of the luſtre of a ſolid thread. Add to this, that the ſpider's thread cannot be wound off, as that of the ſilk-worm may; but muſt, of neceſſity, be carded; by which means being in pieces, its evenneſs, which contributes much to its luſtre, is deſtroyed. In effect, this want of luſtre was taken notice of by M. de la Hire, when Mr. Bonn preſented a pair of ſtockings to the academy.

Again, ſpiders furniſh much leſs ſilk than the worms: the largeſt bags of theſe latter weigh four grains: the ſmaller three grains; ſo that 2304 worms produce a pound of ſilk. The ſpiders bags do not weigh above one grain; yet, when cleared of their duſt and filth, loſe two thirds of their weight. The work of 12 ſpiders, therefore, only equals that of one ſilk-worm; and a pound of ſilk will require at leaſt 27648 ſpiders. But as the bags are wholly the work of the females, who ſpin them to depoſit their eggs in, there muſt be kept 55296 ſpiders, to yield a pound of ſilk. Yet will this only hold of the beſt ſpiders, thoſe large ones ordinarily ſeen in gardens, &c. ſcarce yielding a twelfth part of the ſilk of the others. 280 of theſe, he ſhews, would not do more than one ſilk-worm; and 663552 of them would ſcarce yield a pound.

SILLON, in fortification, an elevation of earth made in the middle of the moat, to fortify it, when too broad. It is generally called envelope.

SILVER, a white, rich ſort of metal; being the fineſt, pureſt, moſt ductile, and moſt precious of all metals, except gold. Silver is heavier than any of the other metals, except gold and lead; though it comes after lead, in regard to its gravity, it greatly excels it in fixity, and, of all metals, approaches the neareſt to gold in ſimplicity; bearing all the teſts of fire, and moſt of the ſeverer ones, by the addition of other metalline bodies, in the ſame manner that gold does, and not diſcovering any diverſity of parts by the ordinary means. It is conſiderably hard in compariſon of lead or gold, yet it is malleable and ductile to a very great degree, and may be drawn out in an extremely fine wire. It is leſs capable of ruſt than any other metal, except gold; but it readily becomes black on being rubbed with ſulphur. It is in ſome degree ſonorous in itſelf, and, in compoſition with copper and tin, it makes a metal that is more ſo than thoſe two metals alone would be.

It requires a kind of middle degree of fire to fuſe it, bearing, unaltered, a ſtronger heat than either lead or gold, but melting much eaſier than copper or iron. It may be ſtrictly ſaid to grow red-hot before it melts, but the ſtate of ignition, without fuſion, is but inſtantaneous in it, and runs as ſoon as ſeen to be red-hot. It amalgamates ready enough with mercury, the readieſt way of mixing them is to have the ſilver in fine filings, very clear from greaſe, and to rub it in a mortar with the mercury. It is fixed in a common fire, ſo as to loſe ſcarce any thing, perhaps, truly ſpeaking, not any thing at all, in the fierceſt degree of it, never ſo long continued: It has been tried by Boerhaave for two months together, in the eye of a glaſs-houſe furnace, and found to loſe only one twelfth part of its weight in the operation; and it is highly probable, that even this loſs might be owing to the ſilver's not being perfectly purified firſt.

Silver, expoſed to the fierceſt fire, collected in the focus of a large burning glaſs, immediately becomes red-hot, and melts; it then crackles, and afterwards emits a thick ſmoak: ſoon after this, is covered with a duſty ſubſtance, or calx. If the ſilver have been refined by means of antimony, the calx is of a yellowiſh hue, and, if kept long enough in the focus, it will vitrify in the ſame manner as gold; but, if it have been refined with lead, the calx is whiter, and Homberg aſſures us, will never vitrify, however long expoſed, even to that degree of heat.

The ſpecifick gravity of ſilver has been variouſly laid down by various experiments; this has been owing to the different degrees of purity of the ſilver they have weighed, or their different accuracy in experiments of this kind; they make its weight to water to be from 10284 to 11091 to 1000, by the niceſt trial; the gravity of the ſilver we have already mentioned, as ſtanding the fire without loſs, is to water as 10470 to 1000.

Silver is purified by means of lead, and bears its action without loſs. Fuſed with antimony, if the effect be not carefully prevented, it turns to ſcoria, and becomes volatile: there is no metal, indeed, except gold alone, that bears the teſt with this rapacious mineral, in the common way.

The proper ſolvent of ſilver is aqua fortis; it is diſſolved readily by this, and not at all by the common aqua regia; yet, under certain circumſtances, aqua regia will diſſolve ſilver: the firſt phlegm which ariſes in diſtilling that menſtruum, when newly made, and when it has been ſome time in digeſtion with gold, will diſſolve ſilver, and will not touch gold; though it cannot be acknowledged, but this liquor is as much aqua regia as what follows in the diſtillation. This, however, is a mere experiment of curioſity, not likely ever to occur in the way of buſineſs, and in that reſpect, though we are acquainted with this accident, which was accidentally diſcovered by Homberg, we may ſay in general, as we uſed to do, that aqua fortis diſſolves ſilver, and not gold; and aqua regia gold, and not ſilver. If but the ſmalleſt quantity of ſea-ſalt be put into aqua fortis, it will no longer give a clear ſolution of ſilver. This gives us a teſt for the goodneſs of aqua fortis; and to this difference in the effect of theſe two menſtrua we owe the only method of ſeparating ſilver from gold, without loſs. If ſilver be fuſed with lead, it loſes its ſound, and its bright colour; if melted with tin, it becomes extremely brittle, and the two metals are very difficulty ſeparated again. It melts and mixes eaſily with copper, and by that means acquires a hardneſs which fits it for our coins and utenſils, much better than in its pure natural ſtate.

Silver, melted with arſenick (which is eaſily done by mixing the arſenick with a little chalk and a little tartar, then wetting it with common water, and then ſtratifying the ſilver with the maſs) receives a part of that ſubſtance into its own body, and ſhews the ſingular effect it has on it in its loſing all its malleability; but the arſenick may be ſeparated from it again by only melting it in a ſtrong fire.

Silver, melted with biſmuth, is afterwards much the more eaſily amalgamated with quickſilver; and what is yet more remarkable, is, that it by this means becomes ſo attenuated, that it will paſs through a leather in much larger quantity mixed with the mercury, than it would otherwiſe have done. It is made much more fuſible, as well as volatile, by antimony, and is ſtrangely debaſed by the fume of burning ſulphur.

Silver is ſaid by ſome to be able to colour the natural gems, and the factitious glaſſes, and paſtes with fine blue; but this is an error wholly owing to the alloy of copper, which is in moſt ſilver, and which has occaſionally ſhewn this effect in the artificial products of this kind; as to the ſuppoſed effect in the natural ones, we have no adequate proof of it, no ſilver ever being ſeparated from any blue gem, nor any proof of its being in any of them having appeared to us in all the experiments we have occaſionally made. Though ſilver in the earth be not capable of communicating any colour to foſſils, it has, however, a power of influencing their figure, and that in a very ſingular manner: it has long been known, that iron determines the cryſtals it enters the compoſition of, as already obſerved, into rhombs, and lead into cubes; but it has not been known that theſe truncated cryſtals and ſpars, preſerved as great curioſities in the cabinets of the curious, owe their figure to ſilver, till ſilver was lately ſeparated from them. As certainly, therefore, as iron or lead can form cryſtal into cubes and rhombs, ſo certainly can ſilver, even in a very ſmall quantity, in-

 fluence

fluence the figure of thofe foffils, and form them into columns truncated at each end.

The chymifts, who fuppofe filver to have fome peculiar affinity to the moon, therefore call it luna; their character for it is this; by this they mean to denote the half of gold, whofe character is a compleat circle; the inner line of this figure, if turned outward, will make it the compleat mark of gold, by which they exprefs the infide of filver, turned outward, would make it gold; for they do not allow that there is any thing foreign or corrofive in this metal, as there is in all the others, except gold itfelf: this corrofive matter they exprefs by a crofs added to the figure, which is wanting only in the characters of gold and filver. It has been fuppofed by many, that filver would afford a blue tincture, but this is wholly erroneous; its folution, if the filver has been thoroughly purified, is always colourlefs, and its cryftals are as pellucid and deftitute of any tinge, as the pureft rock cryftal; but if there be any copper left in the filver, even in ever fo fmall a quantity, the folution will be green or blue. The cryftals of filver are intenfely bitter. If filver be melted with common falt, it blends, with proper management, into a femi-pellucid mafs, called luna cornea, which is very difficulty reduced into filver again, being fo volatile, that it flies wholly off in a fmall degree of heat.

The chymical writers have faid great things of the virtues of filver, but there is very little reafon for placing any dependance on them. The Arabian authors are as fond of it, indeed, as they are of gold, and attribute all thofe effects to a grain or two of it taken internally, that a fufficient quantity of it is apt to create in the poffeffor without fwallowing any of it. They fay it gives great fpirits and chearfulnefs, and fortifies the heart; and add, that in a particular manner it is good for the head. Hence they give leaf filver a place in all their ftrengthening and cordial compofitions, and hence the chymifts have endeavoured to introduce among us a long train of lunar medicines, fuch as argentum potabile, diaphoreticum lunare, bezoardicum lunare, and 50 others, as pompous as infignificant. The only preparations which keep up their credit in the fhops, are, the lunar cryftals and lunar cauftick.

SILVER-MINES, *and the different Sorts of Ore.* There are a great number of filver mines in different parts of the world; but the richeft and moft copious are in America, efpecially in Potofi, one of the provinces of Peru. The veins of ore were, in the beginning, but at a very fmall depth in the mountain of Potofi, but by degrees the miners were obliged to dig deeper into the bowels of the mountain, in order to follow the veins; and at prefent the fhafts are fo deep, that it requires upwards of 400 fteps to arrive at the bottom. The veins at this depth are found to be of the fame quality as thofe formerly difcovered near the furface; and the mine is rich. It feems to be inexhauftible; but the working in it becomes more difficult every day, and often proves fatal to the greateft part of the workmen, by the exhalations arifing from the bottom of the mine, and which fpread even to the extremities. No perfon can endure fo deftructive an air more than one day at a time, nor are the animals which feed on the adjacent places free from its effects. They often meet with metallick veins, which yield fuch pernicious vapours as kill inftantly; thefe they are obliged immediately to fhut up, and leave them entirely. The greateft part of the workmen, after they have wrought in the mines for a confiderable time, become difabled. It is aftonifhing to find how many Indians have loft their lives fince they began to work thefe mines, and the numbers that die ftill every day. The filver ore, though contained in the fame vein, is not always of the fame colour and quality: in Peru they call it minerai; if it be white or grey, mixed with red or whitifh fpecks, they call it platablancha; and this is the richeft and the eafieft ore to work. They likewife find a black ore like the fcoria of iron, which they term plomo-ronco. There is another fpecies of black ore, to which they have given the name of bofficler, becaufe it turns red on being wet and rubbed againft iron. The ore called zoroche fhines like talck, and, though it looks as if it contained filver, yet they extract but little of that metal from it; the paco ore is of a red colour, with a caft of yellow in it, and is found in little and very foft pieces, and is but a poor ore: the green ore, called cobriffo, is almoft friable; the particles of filver in it may be feen with the naked eye, but it is very difficult to extract them. There is alfo, in the mine of Catamito in Potofi, an ore called aranea, which confifts of threads of pure filver; this is what they call filver ore in fmall threads. Thefe filaments are always richer towards the centre than towards their extremities; but the filver abounds moft where thefe threads interfect each other. The two firft mines of Potofi were opened in the year 1545; the one called Rica, and the other Diego Centeno. The firft was rafed fome diftance above the level of the ground, in the form of a cock's comb, being 300 feet long and 13 broad. The ore of this mine was fo rich, that almoft half of it was pure filver, to the depth of 50 or 60 fathoms, where it began to change a little.

The richeft filver mines are only to be found in the cold places of America. The climate of Potofi is fo very cold, that formerly the Spanifh women could not lie in there, but were obliged to remove 20 or 30 leagues beyond it, in order to have a milder climate: but at prefent they lie in as eafily at Potofi, as the native Indians themfelves. At the foot of the mount of Potofi ftands the town of the fame name, which is become famous on account of the great riches its inhabitants have drawn from the mountain. There are in this town upwards of 60,000 Indians, and 10,000 Spaniards. They oblige the neighbouring parifhes to furnifh a certain number of Indians every year to work in the mines; and this is what they call mita or their quota: the greateft part carry their wives and children with them, but they all go thither with the greateft reluctance. This fervitude lafts only a year, after which they are at liberty to return to their former habitations: but a great many fettle in Potofi, which by that means becomes every day more and more populous. Though the mines of Potofi are the leaft dangerous, yet without the herb paraguai, which the miners take by the way of infufion, as we do tea, or chew it like tobacco, they muft foon quit them. The mines of Potofi and Lipes ftill maintain their reputation; however, there have been others difcovered fome years ago that are reckoned richer; fuch are thofe of Oruvo, eight leagues from Arica; and thofe of Ollacha, near Cufco, which were difcovered in 1712.

The Method of extracting SILVER *from the Ore.* In order to extract filver from the ore, they firft break it into pretty fmall pieces, and then grind it with iron peftles, weighing about 200lb. and which commonly are moved by water. The ore, when pounded, is paffed through a fieve of iron or copper, and then kneaded with water to a pafte, which they leave to dry a little; afterwards they knead it a fecond time with fea-falt; and at laft they throw fome mercury upon it, and knead it a third time, in order to incorporate the mercury with the filver; being what they call an amalgama. Eight or 10 days are fufficient for this procefs in temperate places; but in cold countries it fometimes requires a month or fix weeks. They then throw the pafte into large tubs or lavaturies, in order to feparate the earth from it; thefe tubs confift of three bafons ftanding over a current of water, which carries off the earth, after it has been fteeped in each bafon. In order to facilitate the operation, they conftantly ftir the pafte with their feet, that, when the water comes clear out of the bafons, there may remain at the bottom only filver and mercury amalgamated together; and this is what they call pigna. They endeavour to extract the mercury which is not incorporated with the filver, by preffing the pigna, beating it ftrongly, or bruifing it in a prefs or mill. There are pignas of different fizes and different weights; they commonly contain a third of filver, and two thirds of mercury. They lay the pigna upon a trevet, placing under it a veffel full of water; and cover the whole earth in form of a cap, which they furround with burning coals. The action of the fire caufes the mercury to evaporate from the pigna, and falls into the water where it is condenfed. The interftices which the mercury occupied in the pigna continue empty, and there remains only a porus or light mafs of filver, compared with its former bulk.

Silver is likewife extracted from the ore in the following manner: they firft break the ore, and fometimes wafh it, to feparate the ftony particles which have been reduced

duced to a powder: after this they calcine it, in order to extract from it the ſulphur and arſenick: this is what they call roaſting the ore; after which they waſh it again, to free it from the calcined powder. The ore being thus prepared, they fuſe it with lead or litharge, or with copel-heads that have been uſed before; they employ granulated lead for this purpoſe, when the work is but ſmall. The harder the ore is to melt, the more lead they mix with it: about 16 or 20 parts of lead to one of ore. This proceſs is called ſcorifying: the ſcoria conſiſts of lead vitrified with the ſtone, and with whatever elſe is not gold or ſilver in the ore; and the metal precipitates into a regulus. If this regulus looks pretty fine, and of a metallick colour, they put it into the copel; but, if it ſtill be mixed with ſcoria, and black, they melt it over again with a ſmall quantity of glaſs or lead.

In order to ſeparate the ſilver from the mercury, with which it is amalgamated, they have a furnace with an aperture at the top; this aperture they cover with a ſort of dome made of earth in a cylindrical form, which may be left on or taken away at pleaſure. When they have put the maſs of ſilver and mercury into the furnace, laid on the cover, and lighted the fire, the quick-ſilver riſes in the form of vapours, and adheres to the dome, from whence they collect it, and uſe it again for the ſame purpoſe.

When the ſilver is well purified, ſo that all heterogeneous matter either metallick or other, that might be mixed with it, is extracted, they ſay it is 12 carats fine. This is the expreſſion they uſe to denote the quality of the pureſt ſilver, without any mixture or alloy; but, if there ſhould remain any, they deduct the weight of the mixture from the principal weight, and the remainder ſhews the value of the ſilver. The carat conſiſts of 24 grains; ſo that, when to the weight of 12 carats there are 12 grains of mixture, the value of the ſilver is 11 carats 12 grains: and ſo of any other.

Refining of SILVER. As to refining, it is differently performed in different countries, and according to the different intentions of the refiners. The refining of ſilver with lead is performed with a very dry copel, which they make red-hot in a reverberatory furnace; and after this they put the lead into it, uſing more or leſs, according as the ſilver which they would copel is ſuſpected to have more or leſs alloy. See ASSAYING.

The many different methods of refining ſilver, having been found inconvenient and tedious, induced M. Homberg to attempt the diſcovering a method of ſhortening the proceſs, in which he ſucceeded. It conſiſts in calcining ſilver with half its weight of common ſulphur; and, after fuſing the whole together, throwing upon it at different times a certain quantity of filings of ſteel; by which means the ſulphur quits the ſilver, in order to unite with the iron, and both the one and the other turn to a ſcum that ſwims a top of the ſilver; and there is found at the bottom of the crucible the purified matter.

Shell SILVER, is made with ſilver leaf ground with new honey, and, after pouring a ſmall quantity of aqua fortis on it, the menſtruum is poured off, and the ſilver kept for uſe.

SILVER-TREE, *Protea*, in botany, a genus of plants, which are natives of the Cape of Good Hope, and are noticed for the beauty of their ſhining ſilvery leaves; but being ſomewhat tender, they require a green-houſe, to preſerve them in winter.

SILVERING, the covering any thing with ſilver. It is uſual to ſilver metals, wood, paper, &c. which is performed either with fire, oil, or ſize. Metal-gilders ſilver by the fire: painter-gilders all the other ways. See GILDING.

To ſilver copper or braſs: 1. Cleanſe the metal with aqua fortis, by waſhing it lightly, and immediately throwing it into fair water: or by heating it red-hot, and ſcouring it with ſalt and tartar, and fair water, with a ſmall wire bruſh. 2. Diſſolve ſome ſilver in aqua fortis, in a broad-bottomed glaſs veſſel, or of glazed earth, then evaporate away the aqua fortis over a chaffing-diſh of coals. 3. Put five or ſix times its quantity of water, or as much as will be neceſſary to diſſolve it perfectly, on the remaining dry calx; evaporate this water with the like heat; then put more freſh water, and evaporate again; and if need be, the third time, making the fire towards the latter end ſo ſtrong, as to leave the calx perfectly dry, which, if your ſilver is good, will be of a pure white. 4. Take of this calx, common ſalt, cryſtal of tartar, of each a like quantity, or bulk, and mixing well the whole compoſition, put the metal into fair water, and take of the ſaid powder with your wet fingers, and rub it well on, till you find every little cavity of the metal ſufficiently ſilvered over. 5. If you would have it richly done, you muſt rub on more of the powder, and in the laſt place waſh the ſilvered metal in fair water, and rub it hard with a dry cloth.

SILVERING *of Looking-Glaſſes*. See FOLIATING.

SILVESTRE, or SYLVESTRE, *Granum*, or *Coccus* SYLVESTRIS, a term uſed by ſome authors to expreſs the coccus Polonicus, and by others, for a coarſe or bad kind of cochineal, produced in the province of Guatimala, in New Spain: it is by ſome ſuppoſed to be the ſeed of the plant; but it is, in reality, a true inſect as the cochineal is; only that the ſcarlet colour it yields, is greatly inferior to the other. See COCHINEAL.

SIMILAR, in geometry, &c. is the ſame as like, or of a like nature.

SIMILAR *Arches of a Circle*, are ſuch as are like parts of their whole circumferences.

SIMILAR *Bodies*, in natural philoſophy, are called ſuch as have their particles of the ſame kind and nature one with another.

SIMILAR *plane Numbers*, are thoſe numbers which may be ranged into the form of ſimilar rectangles: that is, into rectangles whoſe ſides are proportional, ſuch are 12 and 48; for the ſides of 12 are 6 and 2, and the ſides of 48 are 12 and 4. But 6. 2 :: 12. 4. and therefore thoſe numbers are ſimilar.

SIMILAR *Polygons*, are ſuch as have their angles ſeverally equal, and the ſides about thoſe angles proportional.

SIMILAR *Rectangles*, are thoſe which have their ſides about the equal angles proportional.

1. All ſquares are ſimilar rectangles.

2. All ſimilar rectangles are to each other as the ſquares of their homologous ſides.

SIMILAR *right-lined Figures*, are ſuch as have equal angles, and the ſides about thoſe equal angles proportional.

SIMILAR *Segments of a Circle*, are ſuch as contain equal angles.

SIMILAR *Curves*. Two ſegments of two curves are called ſimilar, if, any right-lined figure, being inſcribed within one of them, we can inſcribe always a ſimilar right-lined figure in the other.

SIMILAR *Conick Sections*. Two conick ſections are ſaid to be ſimilar, when any ſegment being taken in the one, we can aſſign always a ſimilar ſegment in the other.

SIMILAR *Diameters of two Conick Sections*. The diameters in two conick ſections are ſaid to be ſimilar, when they make the ſame angles with their ordinates.

SIMILAR *Solids*, are ſuch as are contained under equal numbers of ſimilar planes, alike ſituated.

SIMILAR *Triangles*, are ſuch as have all their three angles reſpectively equal to one another.

1. All ſimilar triangles have the ſides about their equal angles proportional.

2. All ſimilar triangles are to one another as the ſquares of their homologous ſides.

SIMILE, or SIMILITUDE, in rhetorick and poetry, a compariſon of two things, which, though different in other reſpects, yet agree in ſome one. As, he ſhall be like a tree planted by the water-ſide, &c.

SIMONIANS, in eccleſiaſtical hiſtory, a ſect of ancient hereticks, ſo called from their founder, Simon Magus, or the magician. The hereſies of Simon Magus were principally his pretending to be the great power of God, and thinking that the gifts of the Holy Ghoſt were venal, and to be purchaſed with money. He is ſaid to have invented the Æons, which were ſo many perſons of whom the Godhead was compoſed. His concubine Helen, he called the firſt intelligence, and mother of all things; and ſometimes he called her Minerva, and himſelf Jupiter. Simon Magus gained a great many proſelytes, who paid himſelf and his concubine divine wor[illegible]ſt hereticks, and thoſe that St. John, St. Peter and St. Paul, in their epiſtles, ſo often warn the Chriſtians againſt.

SIMONY, *Simonia*, the crime of trafficking with ſacred things, particularly of purchaſing a benefice with money.

SIMPLE,

SIMPLE, fomething not mixed or compounded; in which fenfe it ftands oppofed to compound.

SIMPLE *Quantities*, in algebra, are fuch as have but one fign, either pofitive or negative. Thus $2a$ and $3b$ are fimple quantities; but $a+b$ and $x-y+z$ are compound ones.

SIMPLE, in botany, is a general name given to all herbs and plants; as having each its particular virtue, whereby it becomes a fimple remedy.

SIMPLE *Concords*, are thofe wherein we hear at leaft two notes in confonance; as a third and fifth; and, of confequence, at leaft three parts. See CONCORD.

SIMPLE *Counter-point*, is an harmonical compofition, wherein note is fet againft note; in oppofition to figurative counterpoint.

SINAPIS, muftard, in botany, a genus of plants, whofe flower is tetrapetalous and cruciform, containing four ovate nectariferous glandules, with fix erect fubulated filaments, two of which are the length of the cup, and the others longer; thefe are topped with fpreading acuminated antheræ: the fruit is an oblong rough pod, having two cells which contain a number of globofe feeds.

The common ufe of muftard is known to every one, and is very proper for people of a cold conftitution, becaufe it creates an appetite, helps digeftion, and attenuates food; the feeds are ftomachick, diaphoretick, antifcorbutick, and are good in hypochondriack difeafes, as well as in fleepy diforders: the powder of them taken in white wine is excellent againft the fcurvy; and fome affirm it will cure a quartan ague, if taken in hot wine two hours before the fit. The white muftard is ufed as a fallad herb, efpecially in winter and fpring.

SINAPISM, in pharmacy, an external medicine in form of a cataplafm, compofed chiefly of muftard feed pulverized, and mixed with the pulp of figs, or with briony, garlick, onion, or the like. See the preceding article.

SINCIPUT, the anterior part of the head.

SINE, or *right* SINE *of an Arch*, in trigonometry, is a right line drawn from one end, or termination of an arch, perpendicular to the radius drawn to the other termination of the arch; being always equal to half the chord of twice the arch.

Whole SINE, *Sinus totus*, the fine of 90°, being equal to the radius or femidiameter.

SINE *Complement*, or *co*-SINE *of an Arch*, is that part of the diameter intercepted between the centre and fine, and is equal to the fine of the complement of that arch.

Verfed SINE *of an Arch*, is the part of the diameter intercepted between the fine and the periphery.

SINE-CURES, are ecclefiaftical benefices without cure of fouls.

SINEW, properly denotes what we call a nerve; though, in common fpeech, it is rather ufed for a tendon.

SINGULAR NUMBER, in grammar, the firft manner of declining nouns, and conjugating verbs; ufed when we only fpeak of a fingle perfon or thing. The Latins, French, Englifh, &c. have no number but the fingular and plural; the Greeks and Hebrews have likewife a dual.

SINGULTUS, in medicine, a convulfive motion of the midriff, commonly called hiccup.

SINICAL QUADRANT, a kind of quadrant furnifhed with an index and fights to take altitudes, &c. by; and, befides its fides or face, covered with fines, drawn from each fide, interfecting each other; whereby the feamen can folve, by infpection, any problem in plain failing; for its conftruction and ufe, fee QUADRANT.

SINISTER, fomething towards the left hand. Hence, fome derive the word finifter a finendo, becaufe the gods, by fuch auguries, permit us to proceed in our defigns.

SINISTER, in heraldry. The finifter fide of an efcutcheon is the left hand fide.

SINISTER *Chief*, is the left angle of the chief.

SINISTER *Bafe*, is the left hand of the bafe.

SINOPER, *Sinopis*, in natural hiftory, a native red ftone or ruddle.

SINOPLE, or SENOPLE, in heraldry, denotes vert, or the green colour in armouries.

SINUOSITY, a feries of bends and turns in arches or other irregular figures, fometimes jetting out, and fometimes falling in.

SINUS, in anatomy; the vagina is called the finus muliebris, or finus pudoris; and certain cavities in the dura mater. A finus of a bone is a cavity which receives the head of another bone. In furgery, a finus is a collection of matter, with a fmall orifice for the difcharge thereof.

SIPHON, or SYPHON, in hydraulicks, a crooked tube, one leg or branch whereof is longer than the other; ufed in the raifing of fluids, emptying of veffels, and in various hydroftatical experiments.

Wolfius particularly defcribes two veffels under the name of fiphons; the one cylindrical in the middle, and conical at the two extremes; the other globular in the middle with two narrow tubes fitted to it, axis-wife; both ferving to take up a quantity of water, &c. and to retain it, when up. But the moft ufeful and celebrated fiphon is that which follows: a crooked tube A B C (*plate* LXXII. *fig*. 10.) is provided of fuch a length, and with fuch an angle, as that, when the orifice A is placed on a horizontal plane, the height of A B may not exceed 30 feet. For common ufes a foot or half a foot high fuffices. If now the lefs arm A B be immerged in water, or any other liquid, and the air be fucked out of it by the aperture C, till the liquor follow; the liquor will continue to flow out of the veffel through the tube B C, as long as the aperture A is under the furface of the liquor.

Note, inftead of fucking out the air, the event will be the fame, if the fiphon be at firft filled with the fluid, and the aperture C ftopped with the finger, till the aperture A be immerged.

SIREN, in antiquity, a mermaid; a name given to a kind of fabulous beings reprefented by Ovid, &c. as fea monfters with women's faces and fifhes tails; and by others decked with a plumage of various colours. Claudian fays, they inhabited harmonious rocks; that they were charming monfters; and that failors were wrecked on their rocks without regret, and even expired in rapture: dulce malum pelago Siren.

SIRIUS, in aftronomy, the dog-ftar; a very bright ftar of the firft magnitude in the mouth of the conftellation canis major, or the great dog.

SITE, or SCITE, *Situs*, denotes the fituation of a houfe, meffuage, &c. and fometimes the ground-plot or fpot of earth it ftands on.

SITE, or SCITE, *Situs*, in logick, one of the predicaments, declaring the fubject to be fo and fo placed.

SITUS, in geometry and algebra, denotes the fituation of lines, furfaces, &c. Wolfius gives us fome things in geometry, which are not deduced from the common analyfis; particularly matters depending on the fitus of lines and figures. M. Leibnitz has even invented a particular kind of analyfis, called analyfis fitus, and built a peculiar kind of calculus thereon, called calculus fitus.

SIXAIN, SIXTH, *Saxegena*, in war, an ancient order in battle, wherein fix battalions being ranged in one line, the fecond and fifth are made to advance, to form the van-guard; the firft and fixth to retire, to form the rear-guard; the third and fourth remaining on the fpot to form the corps, or body of the battle.

SIX-CLERKS, officers in chancery, of great account, next in degree below the 12 mafters; whofe bufinefs is to enroll commiffions, pardons, patents, warrants, &c. which pafs the great feal. Under them were formerly 60 clerks, who, with the under clerks, did the bufinefs of the office, which number was afterwards increafed to 90. At prefent the number is indefinite; an order having been made for reducing them to the ancient number of 60, by not filling up the vacancies that may happen by death, &c. till they are fallen to that ftandard.

SIXTH, *Sexta*, in mufick, one of the fimple original concords, or harmonical intervals.

The fixth is of two kinds, greater and leffer; and hence is efteemed one of the imperfect concords, though each of the two fpecies arifes from a divifion of the octave.

The greater fixth, called by the Greeks hexachordon majus, is the concord refulting from the mixture of the founds of two ftrings that are to each other as five to three.

The leffer fixth, hexachordon minus, refults from two ftrings, which are to each other as eight to five.

The leffer fixth is compofed diatonically of fix degrees, whence its name; and of five intervals, three whereof are tones, and two femi-tones; chromatically of eight femitones, five whereof are greater, and three lefs; it has its

form and origin from the ratio fuper-tri-partiens quintas, as eight to five.

The greater fixth is compofed diatonically, like the lefs, of fix degrees and five intervals, among which are four tones and two femi-tones: and chromatically of nine femi-tones, five whereof are greater and four lefs. Of confequence, it has a leffer femi-tone more than the former. It has its origin from the ratio fuper-bi-partiens tertias, as five to three. Befides the two kinds of fixths here defcribed, which are both good concords, there are two others which are vicious and diffonant.

The firft is the defective fixth, compofed of two tones and three femi-tones, or feven femi-tones, five whereof are greater, and two lefs.

The fecond is the redundant fixth, compofed of four tones, a greater femi-tone, and a lefs. Whence fome call it pentatonon, as comprehending five tones. Thefe two, being both difcords, fhould never be ufed in melody, and very rarely in harmony.

SIXTH, in the military art. See SIXAIN.

SIZE, an inftrument ufed to find the fize of pearls withal. It confifts of five thin pieces, or leaves, about two inches long, and half an inch broad, faftened together at one end by a rivet. In each of thefe are feveral round holes drilled, of different diameters. Thofe in the firft leaf ferve for weighing pearls from half a grain to feven grains. Thofe of the fecond, for pearls from eight grains or two carats, to five carats, &c.

SIZE, is alfo a kind of paint, varnifh or glue, ufed by painters and others. The fhreds and parings of leather, parchment, or vellum, being boiled in water and ftrained, make fize.

The beft gold-fize for burnifhing is made as follows: take fine bole, what quantity you pleafe, grind it finely on a marble, then fcrape into it a little beef-fuet: grind all well together; after which mix a fmall proportion of parchment-fize, with a double proportion of water, and it is done.

To make filver-fize: take tobacco pipe clay, in fine powder, into which fcrape fome black lead and a little Genoa-foap, and grind them all together with parchment-fize, as already directed.

SKELETON, in anatomy, an affemblage or arrangement of all the bones of a dead animal, dried, cleanfed, and difpofed in their natural fituation, and kept in that difpofition by means of wires, &c.

Explanation of Plate LXXIII. reprefenting the fkeleton of a human body.

a, The frontal bone. *b*, The coronal future. *c*, The parietal bone. *d*, The occipital future. *e*, The temporal bone. *f*, The maftoide apophyfis. *g*, The zygomatical apophyfis. *h*, The temporal apophyfis. *i i*, The bones of the cheek. *k*, The external part of the bone that lines the orbits of the eye. *l*, The os planum. *m*, The os unguis. *n*, The upper apophyfis of the maxillary bone. *o*, The bone of the nofe. *p*, The partition of the nofe. *q q*, The maxillary bone. *r*, *r*, The lower jaw. *f*, The orbit of the eye. *t*, The inferior part of the orbit. *u*, The fifth vertebræ of the neck. *x*, The fixth. *y*, The hole of their tranfverfe apophyfes. *z*, The chin. 1, 2, 3, The fternum. 4, The clavicles. 5, 6, 7, 8, 9, 10, 11, The true ribs. 12, 13, 14, The falfe ribs. 15, 16, 17, 18, The cartilages which unite the true ribs to the fternum. 19, The laft vertebræ of the back. 20, 21, The five vertebræ of the loins. θ, ω, Their tranfverfe apophyfes. 22, 22, The os facrum. τ, τ, The orifice of the os facrum. 23, The amoplata. 24, The humerus, or bone of the arm. 25, The radius. 26, The os cubitus. 27, The carpus. 28, The metacarpus. 29, The phalanges, or bones of the fingers. 30, The os illium. 31, The os pubis. 32, The os ifchium. Thefe three laft bones compofe the offa innominata. 33, The foramen ovale. 34, The os femoris. α, Its head. β, Its neck. Δ, The great trochanter. ε, The little trochanter. η, The internal condyle. λ, The external condyle. 35, The rotula. 36, The tibia. γ, The external condyle. δ, The internal condyle. μ, The ligament of rotulo. φ, The malleolus internus. 37, The fibula. ϖ, The malleolus externus. 38, The tarfus. 39, The metatarfus. 40, The phalanges of the toes.

SKIN, in anatomy. See CUTIS.

SKIRMISH, in war, a diforderly kind of combat, or encounter, in prefence of two armies, between fmall parties, or perfons who advance from the main body for that purpofe, and introduce, or invite to, a general, regular fight.

SKULL, in anatomy. See CRANIUM.

SKY, the blue expanfe of air, or atmofphere. Sir Ifaac Newton attributes the azure colour of the fky to vapours beginning to condenfe therein, which have attained confiftence enough to reflect the moft reflexible rays, viz. the violet ones; but not enough to reflect any of the lefs reflexible ones. M. de la Hire attributes it to our viewing a black object, viz. the dark regions beyond the limits of the atmofphere, through a white or lucid one, viz. the air illuminated by the fun: a mixture of black and white always appearing blue. But this conjecture is not originally his, being as old as Leonardo da Vinci.

SLATE, a blueifh fiffile ftone, very foft when dug out of the quarry, and therefore eafily cut or fawed into thin long fquares, to ferve inftead of tiles for the covering of houfes; alfo for making tables, &c. The ancients were unacquainted with the ufe of flate, and inftead thereof covered their houfes with fhingles, as we read in Pliny. Befides the blue flate, we have alfo in England a greyifh flate, called alfo Horfham ftone, from a town in Suffex of that name, where the greateft quantities of it are found. The blue flate is very light and lafting, but chargeable withal, becaufe the roof muft be firft boarded over, the flates hung with tacks and laid with finer mortar than tiles. The grey flate is chiefly ufed in covering churches, chancels, &c.

SLAVE, a perfon in the abfolute power of a mafter, either by war or conqueft.

SLEEP is defined to be that ftate wherein the body appearing perfectly at reft, external objects move the organs of fenfe as ufual, without exciting the ufual fenfations. With regard to medicine, fleep is defined by Boerhaave, to be that ftate of the medulla of the brain wherein the nerves do not receive fo copius nor fo forcible an influx of fpirits upon the brain, as is required to enable the organs of fenfe and voluntary motion, to perform their functions. Sleep being one of the non-naturals, it is not poffible for thofe to preferve their health, who do not go to fleep in a regular manner; for fleep repairs the fpirits, which are diffipated by watching; and confequently it reftores the ftrength of thofe who are weak, indifpofed, or labour much. It likewife promotes perfpiration, contributes greatly to digeftion, and more to nutrition.

SLEEPER, or the GREAT SLEEPER, in zoology, the hairy-tailed mus with red feet. This is the fize of the rat, but more corpulent; the head is fhort and thick; the opening of the mouth fmall; the noftrils flefh-coloured; the eyes large, black, and prominent; and the ears large and naked. This is frequent in many parts of Europe, and retires in winter into caverns under the ground, where it carries a confiderable ftore of nuts and other fruits.

SLEEPERS, in natural hiftory; a name given to fome animals, which are faid to fleep all the winter; fuch as bears, marmotes, dormice, bats, hedge-hogs, fwallows, &c. We are told, in Med. Effays of Edinb. that thefe do not feed in winter, have no fenfible evacuations, breathe little or none at all, and that moft of the vifcera ceafe from their functions. Some of thefe creatures feem to be dead, and others to return to a ftate like that of a fœtus before the birth; in this condition they continue, till by length of time maturating the procefs, or by new heat, the fluids are attenuated, the folids ftimulated, and the functions begin where they left off.

SLEEPERS, in the glafs-trade, are the large iron bars croffing the fmaller ones, and hindering the paffage of the coals, but leaving room for the afhes.

SLEEPERS, in a fhip, timbers lying before and aft, in the bottom of the fhip, as the rung-heads do: the lowermoft of them is bolted to the rung-heads, and the uppermoft to the futtocks and rungs.

SLIDING, in mechanicks, is when the fame point of a body, moving along a furface, defcribes a line on that furface. See FRICTION.

SLIDING *Rule*, a mathematical inftrument, ferving to work queftions in gauging, meafuring, &c. without the ufe of compaffes; merely by the fliding of the parts of the inftrument one by another. the lines and divifions whereof give the anfwer by infpection.

The New Complete Dictionary of Arts & Sciences. By The Revd. Mr. Middleton &c.

Plate LXXIII.

facing Skeleton.

Coggeshal's SLIDING *Rule.* This instrument is principally used in measuring the superfices and solidity of timber. It consists of two rulers, each a foot long, which are framed or put together various ways; sometimes they are made to slide by one another, like glaziers rules; sometimes a groove is made in the side of a common two feet joint rule, and a thin sliding piece put in, and Coggeshal's lines added on that side: but the most usual and commodious way is to have one of the rulers slide along the groove, made along the middle of the other.

On the sliding side of the rule are four lines of numbers, three whereof are double, that is, are lines to two radius's, and one a single broken line of numbers: the three first, marked A, B, C, are figured 1, 2, 3, &c. to 9; then 1, 2, 3, &c. to 10. Their construction, use, &c. are the same as those of Everard's sliding rule. The single line, called the girt line, and noted D, whose radius is equal to the two radius's of any of the other lines, is broke for the easier measuring of timber, and figured 4, 5, 6, 7, 8, 9, 10, 20, 30, &c. from 4 to 5. It is divided into 10 parts, and each 10th subdivided into 2, and so on from 5 to 10, &c.

On the backside of the rule, are, 1°. A line of inch measure, from 1 to 12; each inch being divided and subdivided. 2°. A line of foot measure, consisting of 1 foot, divided into 100 equal parts, and figured 10, 20, 30, &c. The backside of the sliding piece is divided into inches, halves, &c. and figured from 12 to 24; so that, when slid out, there may be a measure of 2 feet.

Use of Coggeshal's SLIDING *Rule, in measuring plain Superficies.* 1. To measure a square. Suppose, e. gr. the sides be each 5 feet; set 1 on the line B, to 5 on the line A; then against 5 on the line B is 25 feet, the content of the square on the line A.

2. To measure a long square. Suppose the longest side 18 feet, and the shortest 10; set 1 on the line B, to 10 on the line A; then against 18 feet, on the line B, is 180 feet, the contents on the line A.

3. To measure a rhombus. Suppose the side 12 feet and the length of a perpendicular let fall from one of the obtuse angles, to the opposite side, 9 feet; set 1 on the line B, to 12, the length of the side on the line A; then against 9, the length of the perpendicular on the line B, is 108 feet, the content.

4. To measure a triangle. Suppose the base 7 feet, and the length of the perpendicular let fall from the opposite angle to the base 4 feet; set 1 on the line B, to 7 on the line A; then against half the perpendicular, which is 2 on the line B, is 14 on the line A, for the content of the triangle.

5. To find the content of a circle, its diameter being given. Suppose the diameter 3.5 feet; set 11 on the girt line D, to 95 on the line C: then against 3.5 feet on D is 9.6 on C, which is the content of the circle in feet.

6. To find the content of an oval or ellipsis. Suppose the longest diameter 9 feet, and the shortest 4. Find a mean proportional between the two, by setting the greater 9 on the girt line, to 9 on the line C; then against the less number 4 on the line C is 6, the mean proportional sought. This done, find the content of a circle, whose diameter is 6 feet; this, when found, by the last article, will be equal to the content of the ellipsis sought.

Use of Coggeshal's SLIDING *Rule, in measuring Timber.* 1°. To measure timber the usual way. Take the length in feet, half feet, and, if required, quarters; then measure half way back again; then girt the tree with a small cord or line; double this line twice very evenly, and measure this fourth part of the girt or perimeter, in inches, halves, and quarters. The dimensions thus taken, the timber is to be measured as if square, and the fourth of the girt taken for the side of the square, thus; set 12 on the girt line D, to the length in feet on the line C; then against the side of the square, on the girt line D, taken in inches, you have, on the line C, the content of the tree in feet.

For an instance: suppose the girt of a tree, in the middle, be 63 inches, and the length 30 feet, to find the content, set 12 on the girt line D, to 30 feet on the line C; then against 15, one fourth of 60, on the girt line D, is 46.8 feet, the content on the line C. If the length should be 9 inches, and the quarter of the girt 35 inches; here, as the length is beneath a foot, measure it on the line of foot-measure, and see what decimal part of a foot it makes, which you will find .75. Set 12, therefore, on the girt line, to 75 on the first radius of the line C, and against 35 on the girt line is 6.4 feet on C, for the content.

2°. To measure round timber the true way. The former method, though that generally in use, is not quite just. To measure timber accurately, instead of the point 12 on the girt line, use another, viz. 10.635; at which there should be placed a centre-pin. This 10.635 is the side of a square equal to a circle, whose diameter is 12 inches. For an instance: suppose the length 15 feet, and 1-4th of the girt 42 inches, set the point 10.635 to 15, the length; then against 42 on the girt line is 233 feet for the content sought; whereas, by the common way, there arises only 184 feet. In effect, the common measure is only to the true measure, as 11 to 14.

3°. To measure a cube. Suppose the sides to be 6 feet each; set 12 on the girt line D, to 6 on C; then against 72 inches (the inches 6 feet) on the girt line, is 216 feet on C, which is the content required.

4°. To measure unequally-squared timber; that is, where the breadth and depth are not equal. Measure the length of the piece, and the breadth and depth (at the end) in inches: then find a mean proportional between the breadth and depth of the piece. This mean proportional is the side of a square, equal to the end of the piece; which found, the piece may be measured as square timber. For an instance: let the length of the piece of timber be 13 feet, the breadth 23 inches, and the depth 13 inches; set 23 on the girt line D, to 23 on C; then against 13 on C is 17.35 on the girt line D, for the mean proportional. Again, setting 12 on the girt-line D, to 13 feet, the length of the line C; against 17.35 on the girt line is 27 feet, the content.

5°. To measure taper timber. The length being measured in feet, note one third of it; which is found thus: set 3 on the line A, to the length on the line B; then against 1 on A is the third part on B: then, if the solid be round, measure the diameter at each end in inches, and subtract the less diameter from the greater; add half the difference to the less diameter; the sum is the diameter in the middle of the piece. Then set 13.54 on the girt to the length of the line C, and against the diameter in the middle on the girt line is a fourth number on the line C. Again, set 13.54 on the girt line to the third part of the length on the line C; then against half the difference on the girt line is another fourth number on the line C; these two fourth numbers, added together, give the content. For an instance: let the length be 27 feet (one third whereof is 9) the greater diameter 22 inches, and the lesser 18; the sum of the two will be 40, their difference 4, and half the difference 2, which, added to the less diameter, gives 20 inches for the diameter in the middle of the piece. Now set 13.54 on the girt line, to 27 on the line C, and against 20 on D is 51.9 feet. Again, set 13.54 of the girt line to 9 on the line C; and against 2 on the girt line represented by 20 is .196 parts; therefore, by adding 58.9 feet to .196 feet, the sum is 50.096 feet, the content.

If the timber be square, and have the same dimensions; that is, the length 27 feet, the side of the greater end 22 inches, and that of the lesser 18 inches; to find the content, set 12 on the girt line to 27, the length on the line C, and against 20 inches, the side of the mean square on the girt line, is 75.4 feet. Again, set 12 on the girt line to 9 feet, one third of the length, on the line C, and against 2 inches, half the difference of the sides of the squares of the ends on the girt-line, is 25 parts of a foot; both together make 75.65 feet, the content of the solid.

The girt or circumference of a tree, or round piece of timber given; to find the side of the square within, or the number of inches of a side, when the round timber is squared. Set 10 on A to 9 on B, then against the girt on A are the inches for the side of a square on the line B.

SLIDING, is used variously at sea; but chiefly for the hoisting up of casks, or other heavy things, with slings, i. e. contrivances with ropes of different lengths, as the various uses require, with an eye spliced in each end.

SLIPPING, among gardeners, the pulling off a sprig from a branch, or a branch from an arm of the tree. And so a slip may have its rinds double and treble slipped, or its stalks ragged.

SLOOP,

SLOOP, a veſſel with one maſt, and ſeldom exceeding 200 tons. Sloops of war, commonly called men of war ſloops, are much larger, and carry 16 or 18 guns.

SLOUGH, a deep muddy place. The caſt ſkin of a ſnake, the damp of a coal-pit, and the ſcar of a wound, are alſo called by the ſame appellation.

SLOUGH, of a wild boar, is the bed, ſlough, or mire, wherein he wallows, or in which he lies in the day-time.

SLUICE, a frame of timber, ſtone, or other matter, ſerving to retain and raiſe the water of a river, &c. and, on occaſion, to let it paſs. Such is the ſluice of a mill, which ſtops and collects the water of a rivulet, &c. to let it fall at length in the greater plenty upon the mill-wheel: ſuch, alſo, are thoſe uſed in vents or drains to diſcharge water off land. And ſuch are ſluices of Flanders, &c. which ſerve to prevent the waters of the ſea overflowing the lower lands, except when there is occaſion to drown them.

Sometimes there is a canal between two gates or ſluices, in artificial navigation, to ſave the water, and render the paſſage of boats equally eaſy and ſafe, upwards and downwards; as in the ſluices of Briare in France, which are a kind of maſſive walls, built parallel to each other, at the diſtance of 20 or 24 feet, cloſed with ſtrong gates at each end, between which is a kind of a canal or chamber, conſiderably longer than broad, wherein a veſſel being incloſed, the water is let out at the firſt gate, by which the veſſel is raiſed 15 or 16 feet, and paſſed out of this canal into another much higher. By ſuch means, a boat is conveyed out of the Loire into the Seyne, though the ground between them riſe above 50 feet higher than either of theſe rivers. See CANAL.

SMACK, is a ſmall veſſel with one maſt, ſometimes employed as tenders to men of war, and are likewiſe uſed in fiſhing upon the coaſts.

SMALL POX, *Variolæ*, a contagious diſeaſe, conſiſting of a general eruption of particular puſtules tending to ſuppuration, and attended with a fever. The eſſence of this diſeaſe ſeems to be an inflammation of the blood and juices (yet of a different kind from other inflammations) in removing which, nature, for the firſt two or three days, endeavours to correct and digeſt the inflamed particles, which, being afterwards thrown out on the ſurface of the body, ſhe further ripens, and at length totally expels them, in the form of ſmall abſceſſes. Hence, in order to lay a foundation for the method of cure, it muſt be remarked, that this diſeaſe has two ſtages; the firſt is that of a ſeparation, the ſecond that of the expulſion.

1. The ſeparation is moſtly accompanied with a febrile ebullition, and is ordinarily finiſhed in three or four days, during which time nature is employed in collecting the inflamed particles that diſturb the blood, and expelling them to the fleſhy parts; which being over, the former calm returns. 2. The expulſion next ſucceeds, which is performed during the remainder of the diſeaſe, by means of thoſe ſmall abſceſſes in the fleſh, which, like other abſceſſes, undergo the ſtates of crudity, ſuppuration, and exſiccation; and if theſe ſtates are finiſhed in a ſuitable manner, the danger is paſt; but, if otherwiſe, all is diſordered. The expulſion requires a much longer time than the ſeparation, this being performed in a thin fluid body, but that in a denſe ſubſtance, at a greater diſtance from the fountain of life.

Hence the indications are firſt, that, ſuch an equable ebullition of the blood be maintained, that it may neither finiſh the ſeparation too haſtily, by riſing too high, nor retard or render it incomplete, by ſinking too low. 2. That the abſceſſes or eruptions be carefully kept up, ſo that, running through their proper ſtates, they may, at length, entirely diſcharge the matter they contain and vaniſh.

SMALT, a preparation of cobalt, made as follows: the remaining matter of the cobalt from which the flowers have been ſublimed being ſuffered to cool, and then taken out of the furnace, is reduced to fine powder, and calcined over again in the ſame furnace, and this repeated till there is not the leaſt particle of flame or ſmoke ſeen to ariſe from any part of it. The cobalt thus freed from its arſenical and ſulphureous part, is then ground to an impalpable powder, and a mixture is made of 100lb. of this powder, 50lb. of pure white pot-aſh, and 150lb. of pure white ſand; this is all ground together upon a mill, and then put into a proper furnace, like thoſe of our glaſs-houſes, where it runs into an elegant deep blue glaſs. This is afterwards ground to powder in mills for that purpoſe, and makes what we call ſmalt or powder-blue, uſed by our painters and waſherwomen. It has no uſe in medicine. See COBALT.

SMARAGDUS, the EMERALD, in natural hiſtory. See EMERALD.

SMECTIS, a name by which ſome call fuller's earth. See FULLER'S EARTH.

SMELL, *Odour*, with regard to the organ, is an impreſſion made on the noſe, by little particles continually exhaling from odorous bodies: with regard to the object, it is the figure and diſpoſition of odorous effluvia, which, ſticking on the organ, excite the ſenſe of ſmelling: and with regard to the ſoul, it is the perception of the impreſſion of the organ, or the affection in the ſoul reſulting therefrom. The principal organs of ſmelling are the noſtrils, and the olfactory nerves; the minute ramifications of which latter are deſcribed throughout the whole concave of the former.

According to Boerhaave, the act of ſmelling is performed by means of odorous effluvia floating in the air; being drawn into the noſtrils, in inſpiration, and ſtruck with ſuch force againſt the fibrillæ of the olfactory nerves, which the figure of the noſe, and the ſituation of the little bones, render oppoſite thereto, as to ſhake them, and give them a vibratory motion; which action, being communicated thence to the common ſenſory, occaſions an idea of a ſweet, or fœtid, or ſour, or an aromatick, or a putrified object, &c. The matter in animals, vegetables, foſſils, &c. which chiefly affects the ſenſe of ſmelling, Boerhaave obſerves, is that ſubtile ſubſtance inherent in the oily parts thereof, called ſpirit; for that, when this is taken away from the moſt fragrant bodies, what remains has ſcarce any ſmell at all; but this, poured on the moſt inodorous bodies, gives them a fragrancy.

Willis obſerves, that brutes have, generally, the ſenſe of ſmelling in much greater perfection than man; and by this alone, they diſtinguiſh the virtue, and qualities of bodies unknown before; hunt out their food at a great diſtance, as hounds, and birds of prey; or hid among other matters, as ducks, &c. Man having other means of judging of his food, &c. did not need ſo much ſagacity in his noſe; yet have we inſtances of a great deal, even in man. In the Hiſtoire des Antilles, we are aſſured, there are negroes who, by the ſmelling alone, can diſtinguiſh between the footſteps of a Frenchman and a negro. The chymiſts teach, that ſulphur is the principle of all ſmells, and that thoſe are more or leſs ſtrong, as the ſulphur in the odorous body is more or leſs dried or exalted. Sulphur, they ſay, is the foundation of odours, as ſalt is of ſavours, and mercury of colours. See SULPHUR, &c.

SMELT, in ichthyology, the oſmerus, with 17 rays in the pinna ani. This is a beautiful little fiſh; its length is five or ſix inches, and its breadth not great in proportion, but the thickneſs is conſiderable: the head is of an oblong figure, and ſomewhat acute; the opening of the mouth is large, the back is convex, and the belly ſomewhat flat; the lower jaw is a little longer than the upper; the noſtrils ſtand in the middle between the eyes and the extremity of the roſtrum; they have each two apertures; the eyes are large and round, the pupil is black, and the iris of a ſilvery white, but tinged a little with blue towards the upper part.

SMELTING, in metallurgy, the fuſion or melting of the ores of metals, in order to ſeparate the metalline part from the earthy, ſtony, and other parts. See FUSION, ORE, FLUX, GOLD, SILVER, &c.

SMIRIS, in natural hiſtory, the ſame with emery.

SMITHERY, or SMITHING, a natural art, by which an irregular lump of iron is wrought into an intended ſhape. See FORGE.

SMOKE, or SMOAK, *Fumus*, a humid matter, exhaled in the form of vapour, by the action of fire and heat. See FIRE, HEAT, and EXHALATION.

SMOKE-SILVER, and *Smoke-penny*, a payment made to the miniſters of ſeveral pariſhes in lieu of tithe-wood.

SMUGGLERS, in law, thoſe perſons who conceal and run prohibited goods, or goods that have not paid his majeſty's cuſtoms.

SMUT, in huſbandry, a diſeaſe in corn, when the grains, inſtead of being filled with flour, are full of a

ſtinking black powder. As to the cauſe of this diſtemperature, ſome have attributed it to exceſſive rankneſs, or fatneſs of the ſoil; to the manuring the land with rotten vegetables; and to the ſowing ſmutty ſeed. Mr. Bradley thinks it is owing to the ſame cauſe with a blight, viz. to multitudes of inſects. But Mr. Tull is convinced, from experiment, that it is cauſed by two much moiſture; for planting ſeveral plants of corn in troughs of very moiſt earth, they all produced ſmutty ears, while very few ſuch were found in the field, from whence theſe plants were taken. There are two remedies for the ſmut, recommended by writers on huſbandry, viz. ſteeping the ſeed in ſalt brine, and changing the ſeed. See SEED and CHANGE.

The bread made of ſmutty corn is very pernicious, acting as a narcotick, and occaſioning not only ſleepineſs, but vertigoes, and even convulſions.

SMYRNIUM, *Alexanders*, or *Aleſanders*, in botany. See ALESANDERS.

SNAFFLE, in the menage, is a very ſlender bitmouth, without any branches, much uſed in England; the true bridles being reſerved for the ſervice of war. The ſnaffle, or ſmall watering-bit, is commonly a ſcratch-mouth, with two very little ſtraight branches, and a curb, mounted with a head-ſtall, and two long reins.

SNAIL, *Limax*, in zoology, a genus of the gymmarthria, or naked inſects; the body of which is of a figure approaching to cylindrick, and is perforated at the ſide; the tentacula, or horns, as they are called, are four in number, and two of them have the appearance of eyes. Snails are all hermaphrodites, and eſteemed provocatives by the Aſiaticks.

SNAKE, *Anguis*, in zoology. The common ſnake is a harmleſs and inoffenſive animal, and might even be kept tame in houſes to deſtroy vermin: its fleſh is reſtorative, like that of the viper. See VIPER.

SNAKE-ROOT, in botany. See SERPENTARIA.

SNEEZING, *Sternutatio*, a convulſive motion of the muſcles of the breaſt, whereby the air is expelled from the noſe with much vehemence and noiſe. Sneezing is cauſed by the irritation of the upper membrane of the noſe, occaſioned by acrid ſubſtances floating in the air, or by medicines called ſternutatories.

SNIPE, in ornithology, a ſpecies of numenius, with four brown ſtreaks on the back; it is a ſmall but beautiful bird, and its fleſh is delicate, and much eſteemed at table.

SNOW, *Nix*, in meteorology, a meteor produced in this manner: when the vapours are become conſiderably condenſed, yet not ſo far as to be liquified, or diſſolved into water; then by a ſpecial degree of coldneſs in the upper region of the air, the particles of the condenſed vapour are changed into ice; ſeveral of which adhering together, from little fleeces of a white ſubſtance, ſomewhat heavier than the air; and therefore deſcend in a ſlow and gentle manner through it; being ſubject, by reaſon of its lightneſs, to be driven about by the various motions of the air and wind; and is what, when arrived to the ſurface of the earth, we call ſnow. See FROST, HAIL, &c.

The uſes of ſnow muſt be very great, if all be true Bartholin has ſaid in its behalf, in an expreſs treatiſe, *De Nivis Uſu Medico*; he there ſhews, that it fructifies the earth (which, indeed, is a very old and general opinion) preſerves from the plague, cures fevers, cholicks, toothachs, ſore eyes, and pleuriſies; for which laſt uſe, his countrymen of Denmark uſe to keep ſnow-water gathered in March. He adds, that it contributes to the prolongation of life; giving inſtances of people in the Alpine mountains that live to great ages; and to the preſerving dead bodies, inſtances whereof he gives of perſons buried under the ſnow in paſſing the Alps, which are found uncorrupted in the ſummer, when the ſnow is melted.

He obſerves, that, in Norway, ſnow-water is not only their ſole drink in the winter, but ſnow even ſerves for food; people having been known to live ſeveral days without any other ſuſtenance.

Indeed, the generality of theſe medicinal effects of ſnow are not to be aſcribed to any ſpecifick virtue in ſnow, but to other cauſes. It fructifies the ground, for inſtance, by guarding the corn or other vegetables from the intenſer cold of the air, eſpecially the cold piercing winds. And it preſerves dead bodies, by conſtipating and binding up the parts, and thus preventing all ſuch fermentations or internal conflicts of their particles, as would produce putrefaction.

Snow may be preſerved by ramming it down in a dry place, under-ground, and covering it with chaff, in the manner of ice. See ICE.

SNOWDROP, in botany. See GALANTHUS.

SNOWDROP-TREE, the ſame with the chionanthus. See CHIONANTHUS.

SNUFF, a powder chiefly made of tobacco, the uſe of which is too well known to need any deſcription here. See TOBACCO. However, though tobacco be the baſis of ſnuff, yet a multiplicity of other matters are often added, to give it an agreeable ſcent.

SOAL-FISH, *Solea*, in itchthyology, the Engliſh name of the long-bodied pleuronectes, with rough ſcales on both ſides.

SOAP, or SOPE, in commerce, and the manufactures, a kind of paſte, ſometimes hard and dry, and ſometimes ſoft and liquid, much uſed in waſhing, whitening linens, and by dyers, fullers, &c.

The principal ſoaps of our manufactures are, the ſoft, the hard, and the ball ſoap; all which conſiſt of an intimate union of the ſalt of pot-aſh, with oil, or animal fat.

1. The ſoft ſoap is either green or white. The principal ingredients in the green kind are leys drawn from pot-aſhes, and lime boiled up with tallow and oil.

Firſt, the ley and tallow are put into the copper together, and, when melted, the oil is put to them, and the copper made to boil; then they damp or ſtop up the fire, while the ingredients remain in the copper to knit or incorporate; which being done, they ſet the copper boiling again, feeding or filling it with leys as it boils, till they have put in a ſufficient quantity; after which they boil it off with all convenient ſpeed, and put it into barrels.

One ſort of white ſoap is made after the ſame manner with green ſoap, excepting that they do not uſe any oil in this. Another ſort of white ſoft ſoap is made from leys of aſhes of lime, boiled up twice with tallow.

Firſt, they put a quantity of leys and tallow into the copper together, which is kept boiling, being fed with leys as it boils, till it is boiled enough, or that they find it grains; then they ſeparate or diſcharge the leys from the tallowiſh part, which they put into a tub, throwing away the ley: this they call the firſt half boil. Then they charge the copper again with freſh tallow and ley, and put the firſt half-boil out of the tub into the copper a ſecond time, and keep it boiling with freſh ley and tallow, till it is brought to perfection, and afterwards filled out into ſoap-caſks.

2. Hard-ſoap is made of aſhes and tallow, and commonly boiled at twice; the firſt boiling they alſo call a half-boiling, which is performed exactly after the ſame manner as the firſt half-boil of the ſoft white ſoap. Then they charge the copper again with freſh ley, and put into it the firſt half-boil again, feeding it with ley as it boils, till it is boiled enough, or till it grains; then they diſcharge the ley from it, and put the ſoap into a frame to boil and harden.

3. Ball-ſoap is made alſo of ley from aſhes and tallow; they put the ley into the copper, and boil it till the watery part is quite gone, and there is nothing left in the copper but a ſort of nitrous matter (which is the very ſtrength and eſſence of the ley) then they put tallow to it, and keep the copper boiling and ſtirring for half an hour or more, in which time the ſoap is completed, which they put into tubs or baſkets with ſheets in them, and immediately (while ſoft) make it into balls.

It takes up near 24 hours to boil away the watery part of the ley.

The proceſs of ſoap-boiling, as at preſent practiſed, being a very tedious, as well as expenſive, operation, Dr. Shaw propoſes a method to ſhorten it, by ſubſtituting motion in the place of fire; this motion might be eaſily given, by an engine, to any quantities of the ingredients at a time; and that ſuch a method is effectual for making ſoap, the doctor proved by the following experiments: he mixed, in a large phial, half a pint of ſoap ley, with an ounce, or more, of oil-olive; and ſhaking theſe together for a quarter of an hour, a true cake of ſoap was obtained on the top of the liquor, which hardened on being expoſed to the air.

SOAP-EARTH, *Steatites*, a ſmooth unctuous kind of earth found in the Levant, and uſed as a ſcope.

The soap earth, Dr. Smith tells us, is only had in two places near Duraclea, six leagues to the east of Smyrna. It is in effect itself a fine soap, boiling and shooting up out of the earth.

SOCAGE, an ancient tenure, by which lands were held on condition of ploughing the lord's lands, and doing the operations of husbandry, at their own charges. See TENURE and HUSBANDRY.

SOCCUS, in antiquity, a kind of high shoe, reaching above the ancle, worn by comedians, as the cothurnus was by tragedians. See COMEDY, TRAGEDY, and DRAMA.

SOCIETY, *Societas*, in general, denotes a number of persons united together for their natural assistance, security, interest, or entertainment.

Royal SOCIETY, an academy, or college, established by charter, by King Charles II. for promoting natural knowledge, and useful arts, by experiments. See the article ACADEMY. It consists of several hundred fellows, or members, mostly British; some persons of the highest rank, and many eminent gentlemen and learned men of other nations.

Their meetings are held once a week, at their house in Crane-Court, Fleet-Street, London; where they discourse upon the productions and rarities of nature and art, and consider how the same may be improved for the good of mankind: here also they read letters and other philosophical papers, sent by ingenious persons, both at home and abroad; upon which they discourse in the plainest manner, without affecting studied speeches.

This society, of which his Britannick majesty is perpetual patron, is governed by a council of 21 members, 10 of whom are yearly chosen out of the society, on St. Andrew's day: the chief of the council bears the title of President, whose proper office is to call and dissolve the meetings, to propose the matter to be debated, call for experiments, and admit such members as shall be elected, which must be by a majority of at least 21 votes; whereupon he is admitted, after paying 40s. and subscribing, that he will endeavour to promote the good of the Royal Society of London, by the improvement of natural knowledge; and being thus admitted, he afterwards pays 13s. a quarter, as long as he continues a member of the society.

SOCIETY for the reformation of manners, and putting in execution the laws against immorality and profaneness. It was set on foot, about 40 years ago, by five or six private persons in London, but is since exceedingly increased by numbers of all denominations. A particular body of the most considerable hereof bear the expence of prosecutions, &c. without any contribution from the rest. These chiefly apply themselves to the prosecuting people for swearing, drunkenness, and prophaning the sabbath. Another body, of about 50 persons, apply themselves to the suppressing lewdness, and by them above 500 lewd houses have been actually suppressed; a third body consists of constables; and a fourth of informers. Besides these, are eight other regular mixed bodies of housekeepers and officers, who inspect the behaviour of the constables and other officers, assist in searching disorderly houses, seizing offenders, giving information, &c. There are several other societies of this kind at Bristol, Canterbury, Nottingham, &c.

The society for propagating the gospel in foreign parts, was instituted by king William in 1701, for securing a maintenance for an orthodox clergy, and making other provisions for the propagation of the gospel in the plantations, colonies, frontiers, &c. To that end he incorporated the archbishops, several bishops, and other nobility, gentry, and clergy, to the number of 90, with privilege to purchase 2000l. per year, inheritance and estates for lives, or years, with other goods, to any value. They meet yearly on the third Friday in February, to chuse a president, vice-president, and other officers; and the third Friday in every month to transact business, depute fit persons to take subscriptions for the said uses, and of all monies so received to give account to the lord chancellor, &c. They have a standing committee at the chapter-house, to prepare matters for the monthly meeting which is held at St Martin's library.

SOCIETY *for propagating Christian Knowledge*. This was begun, in 1699, by some persons of worth, &c. Its original design was to propagate religion in the plantations, to secure the pious education of the poor at home, and to reclaim those that err in the fundamentals of Christianity. In the year 1701, they had procured considerable charities, and transmitted the same to the plantations, in libraries, bibles, catechisms, &c. with a voluntary maintenance for several ministers to be employed in the plantations; but, the society for propagating the gospel in foreign parts being then instituted, they were incorporated by charter in the same, and thus discharged as a particular society from the further pursuit of that branch of their original design, whereupon they wholly turned themselves to the other, and are now very considerable by great accessions from the clergy and laity. They meet weekly to concert measures for raising charity for educating poor children, and setting up schools for that purpose, as also, for the more regular disposals of pious books for the instruction of the ignorant, erroneous, &c.

SOCINIANS, in church history, a sect of Christian hereticks, so called from their founder Faustus Socinus, a native of Sienna, in Italy.

He placed all religion on certain old- condemned heresies, upon which he did but refine, but were most greedily embraced by his disciples. 1. That man before his fall was naturally mortal. 2. That no man by the light of nature can have any knowledge of God. 3. That man before his fall, had no original righteousness. 4. That there is no original sin in us, as it imports concupiscence, or deformity of nature. 5. That there is a free will to goodness in us, and that we may here fulfil the law. 6. That God hath no fore-knowledge of contingencies determinately, but alternatively. 7. That the causes of predestination are not in God, but in us, and that he doth not predestinate to salvation any particular or certain person; and that predestination may be frustrated. 8. That God could justly pardon our sins without any satisfaction. 9. That Christ by his death did not satisfy for us, but only obtained power for us, to satisfy for ourselves, by our faith and obedience. 10. That Christ died for himself; i. e. not for his sins, (for he was without sin) but for the mortality and infirmities of our nature, which he assumed. 11. That Christ became not our high priest, nor immortal, nor impassible before he ascended into heaven. 12. That death eternal, is nothing else but a perpetual continuance in death or annihilation. 13. That everlasting fire, is so called from its effect, which is the eternal extinction or annihilation of the wicked which shall be found alive in the last day. 14. That Christ's incarnation is against reason, and cannot be proved out of scripture. 15. That Christ is not truly God. 16. That the Holy Ghost is not God; that there is not a Trinity of persons in one God. 17. That the old Testament is needless for a Christian man. *Ross*'s ΠΑΝΣΕΒΕΙΑ.

The Socinians spread extremely in Poland, Lithuania, and Transylvania. Their sentiments are explained at large in their catechism, printed several times under the title of Catechesis Ecclesiarum Colonicarum, unum Deum Patrem, illiusque Filium un genitum, una cum Sancto Spiritu, ex sacra scriptura confitentium. They were exterminated out of Poland in 1655, since which time they have been chiefly sheltered in Holland, where, though their publick meetings have been prohibited, they find means to conceal themselves under the names of Arminians and Anabaptists. See ARMINIAN.

SOCK, or SOK, *Soca*, in law books, denotes jurisdiction.

SOCLE, or ZOCLE, in architecture, a flat square member under the bases of pedestals of statues, vases, &c. which serves as a foot or stand. Continued socle, is a kind of continued stand or pedestal without either base or corniche, ranging round the whole building, called by Vitruvius, stereobata.

SOCMEN, or SOKEMEN, such tenants as held their lands and tenements in socage; but the tenants in ancient demesne, seem most properly to be called socmans. See SOCAGE.

SOCNA, in our old writers, denotes some privilege, liberty or franchise.

SOCOME, is taken for a custom of grinding corn at the lord's mill; whence came the name or term of bond socome, by which the tenants were bound to it: and also love socome, where they did it voluntarily out of love to their lord.

SOCRATICK PHILOSOPHY, the doctrines and opinions, with regard to morality and religion, maintained and taught by Socrates.

By the character of Socrates, left us by the ancients, particularly by his scholars Plato and Xenephon, &c. he appears to have been one of the best and the wisest persons in all the heathen world. To him is ascribed the first introducing of moral philosophy, which is what is meant by that usual saying, that "Socrates first called philo-"sophy down from heaven to earth;" that is, from the contemplation of the heavens and heavenly bodies, he led men to consider themselves, their own passions, opinions, faculties, duties, actions, &c. He wrote nothing himself, yet all the Grecian sects of philosophers refer their origin to his discipline, particularly the Platonists, peripateticks, academicks, cyrenaicks, stoicks, &c. but the greatest part of his philosophy we have in the works of Plato. See PLATONISM.

SODOMY, the unnatural crime of buggery, thus called from the city of Sodom, which was destroyed by fire for the same. The Levitical law adjudged those guilty of this execrable crime to death, and the civil law assigns the same punishment to it. Our law also makes it felony.

There is no statute in Scotland against sodomy; the libel of this crime is therefore founded on the divine law, and practice makes its punishment to be burning alive.

SOFFITA, or SOFFIT, in architecture, any plafond or ceiling formed of cross beams of flying corniches, the square compartments or pannels of which are enriched with sculpture, painting, or gilding; such are those in the palaces of Italy, and in the apartments of Luxembourgh at Paris. This word is particularly used for the under side or face of an architrave, and for that of the corona or larmier, which the ancients called lacunar, the French plafond, and we usually the drip. It is enriched with compartments of roses, and has 18 drops in the Dorick order disposed in three ranks, six in each, placed on the right hand of the guttæ, and at the bottom of the triglyphs.

SOFTENING, in painting, the mixing and diluting of colours with the brush or pencil. To soften designs in black and white made with the pen, &c. signifies to weaken the tint. To soften a portrait, according to Felibien, is to change some of the strokes, and give a greater degree of sweetness and softness to the air thereof, which before had something rough and harsh in it.

SOGETTO, subject, in musick, is used for a song or melody, above or below which some counterpoint is to be made: a counterpoint above the subject, is when the lower part is the subject; in this sense it is called canto fermo. When the counterpoint is made below the subject, the upper part is made the subject. See the article COUNTERPOINT, &c.

SOIL, *Solum*, in agriculture and gardening, denotes earth or ground, considered with regard to the quality of its mould for the production and growth of vegetables. See EARTH, &c. The land of England, as considered by the farmer, is reduced into nine sorts of soil: the sandy, the gravelly, the chalky, the stony, the rocky, the hazely, the black earth, the marsh, and the clay-land. See SAND, GRAVEL, &c.

The supply of fresh vegetable matter, in the place of that which was drained away by the successive growths of plants, is done by several ways, but by none so well, as by letting it lie fallow for some time; in this case the rain falling upon it, the vegetable earth, which this water contains, is deposited in sufficient quantity, and this is alone sufficient to give nutriment to new crops; and it is proved by this, that the rain-water, as well as other water, does contain such earth as is necessary to vegetation. The other means of giving a supply to the exhausted earth are the manures laid on it by the farmer, and these are, all of them, some animal or vegetable remains, and their use is to drain into the earth those particles from themselves, which may be again received into the bodies of new productions of the same kinds. Blood, urine, the excrements of animals, with their several parts, as horns, hoofs, hair, feathers, calcined shells, and vegetable bodies in an altered state, such as lees of wine and beer, ashes of burnt vegetables, leaves, straw, roots, stubble, and the like, when in a decaying state, turned under the earth again by plowing, there become disunited into their component parts, and these again are carried up into other new plants.

If we take off our thoughts from the fields, and look among the gardens, we there meet with farther confirmations of the same thing; the trees, shrubs, and herbs cultivated in these, after they have continued in one station, till they have derived thence the greater part of the matter fitted for their increase and nourishment, will either decay, or degenerate, unless they have a new supply of manure added to the earth about their roots, or are themselves translated into other earth, not so drained of that particular matter out of which they are to be fed.

SOIT FAIT COMME IL EST DESIRE, *Be it done as it is desired*, a form used when the king gives the royal assent to a private bill preferred in parliament.

SOL, in musick, the fifth note of the gamut, *ut, re, mi, fa, sol, la*. See GAMUT.

SOLÆUS, or SOLARIS, in anatomy, one of the extensor muscles of the foot, rising from the upper and hinder part of the tibia and fibula. This is a large and fat muscle, thicker at the middle than at the edges, and is nearly of an oval figure.

SOLANUM, nightshade, in botany, a genus of plants, which includes the melongena and lycopersicon of Tournefort.

The common nightshade rises a firm angular stalk, to the height of a foot and a half, of a blackish-green colour, and divided into several branches; the leaves are oblong, acute-pointed, smooth, of a dark colour, and full of a greenish juice; it grows wild in gardens, dunghills, on the side of highways, &c. and flowers in September. This plant is used to allay inflammations, to soften and relax the fibres which undergo too violent a tension: the bruised herb is applied to the piles, or the part bathed with the juices a little warmed; internally it is seldom used, being often attended with dangerous consequences.

SOLAR, something belonging to the sun: thus the solar system is that system of the world wherein the heavenly bodies are made to revolve round the sun as the centre of their motion. See COPERNICAN.

Also the solar year is that consisting of 365 days, five hours, and 49 minutes, in opposition to the lunar year, consisting of 354 days.

SOLDER, SODDER, or SODER, a metallick or mineral composition used in soldering or joining together other metals. Solders are made of gold, silver, copper, tin, and lead, always observing that in the composition there be some of the metal to the soldered mixed with some higher and finer metals. Goldsmiths usually make four kinds of solder, viz. solder of eight, where to seven parts of silver there is one of brass or copper; solder of six, where only a sixth part is copper; solder of four, and solder of three. It is the mixture of copper in the solder that makes raised plate always come cheaper than flat.

The solder used by plumbers is made of two pounds of lead to one of block-tin. Its goodness is tried by melting it, and pouring the bigness of a crown-piece on a table; for, if good, there will arise little bright shining stars therein. The solder for copper is made like that of the plumbers, only with copper and tin: for very nice works, instead of tin, they sometimes use a quantity of silver. Solder for tin is made of two thirds of tin and one of lead, but where the work is delicate as in organ pipes, where the juncture is scarce discernable, it is made one part of tin glass, and three of pewter.

The duke of Florence's nail, anciently so much admired, as being half iron, and half gold, whereas those two metals were deemed irreconcileable, was joined by a kind of solder made by Turneisser, an ingenious chymist of Venice; the secret whereof was never discovered till published by Tachenius. The solder is a little of Cyprus vitriol put between the gold and the iron. For the great acidity of the gold naturally reduces the iron into a scoria or rust, when the two are applied immediately over one another; but this inconvenience is removed by the interposition of a little copper, be it in the smallest quantity imaginable.

SOLDERING, or SODDERING, among mechanicks, the joining or fastening together two pieces of the same metal, or of two different metals, by the fusion and application of some metallick composition on the extremities of the metals to be joined.

Goldsmiths solder with silver and brass, or copper mixed together; plumbers with lead and tin. Copper is usually soldered with tin, sometimes according to that work

work with a mixture of copper and ſilver. In ſoldering all theſe metals they generally uſe borax in powder, and ſometimes roſin. As to iron, it is ſufficient to beat it red-hot, and, the two extremities being in this caſe hammered together, by this means they become incorporated. In the ſoldering either of gold, ſilver, copper, &c. there is generally uſed borax in powder, and ſometimes roſin.

SOLDIER, a military man liſted to ſerve a prince or ſtate, in conſideration of a certain daily pay.

The ſoldiers are properly the land forces of a kingdom or ſtate; but in England it is againſt the ancient law to keep an army of ſoldiers in time of peace. Where any ſoldier that is lawfully retained ſhall depart from his colours without licence, he is declared to be guilty of felony by 18 Hen. VI. c. 9. and every ſoldier who either cauſes a mutiny or deſerts the ſervice, ſhall be puniſhed with death or otherwiſe, as a court-martial ſhall think fit. Alſo perſons ſuſpected of deſertion are to be apprehended by conſtables, who ſhall be allowed a reward of 20s. for every ſuch deſerter.

By the 4 Geo. I. c. 4. it is ordained, that no ſoldier ſhall be taken out of the ſervice by any proceſs at law, unleſs it be for ſome criminal matter, or where the debt he owes amounts to 10l. at the leaſt, of which affidavit is to be made, &c. Soldiers muſt be quartered in inns and alehouſes only, and not in private houſes, without the conſent of the owners, under certain penalties: and where victuallers refuſe ſoldiers quartered on them, or conſtables receive any reward for excuſing their neglect, they forfeit a ſum not above 50l. nor under 30s. by 3 Geo. II. c. 2. A perſon inliſted for a ſoldier, within four days after, is to be carried before the next juſtice or chief magiſtrate of a town, and is to declare his aſſent that he liſted voluntarily, &c. but if he then diſſents thereto, on his returning the money received, and paying 20s. he may be diſcharged. In caſe any ſubject of Great Britain or Ireland ſhall liſt or enter himſelf, or procure any one to be enliſted a ſoldier to go beyond the ſeas, without leave obtained from his majeſty, ſuch perſon ſhall be puniſhed as a felon by 8 and 9 Geo. II. There are acts annually made for puniſhing mutiny, &c. of ſoldiers and falſe muſters, and for the better payment of the army and their quarters, &c.

SOLE, in the menage, a nail or ſort of horn under a horſe's foot, which is much more tender than the other horn that encompaſſes the foot, and by reaſon of its hardneſs is properly called the horn or the hoof. A horſe's ſhoe ought to be ſet upon the hoof as not to bear upon the ſole, for otherwiſe the ſole will be hurt, and not only make the horſe lame, but corrupt the fleſh that ſeparates it from the coffin-bone. To take out the ſole, is to do it without touching the horn of the hoof; or if you take off the horn, you make a hoof-caſt.

Sole-Tenant, one that holds lands, &c. by his own right only, without any other perſon joined. A perſon muſt be ſeiſed of a ſole eſtate to deviſe the ſame by will, or for the wife to have a dower therein, &c. And where a man and his wife hold land for their lives, the remainder to their ſon, in that caſe, if the man dies, the lord ſhall not have heriot, becauſe he does not die ſole-tenant.

SOLECISM, *Solæciſmus*, in grammar, a falſe manner of ſpeaking, contrary to the uſe of language and the rules of grammar, either in reſpect of declenſion, conjugation, or ſyntax.

SOLEMN, *Solemnis*, ſomething performed with much pomp, ceremony, and expence: thus we ſay, ſolemn feaſts, ſolemn funerals, ſolemn games, &c. See Feast, Funeral, &c.

Solemn, in law, ſignifies ſomething authentick, or that is cloathed in all its formalities.

SOLFAING, in muſick, the naming and pronouncing of the ſeveral notes of a ſong, by the ſyllables ſol, fa, la, &c. in learning to ſing it.

Mr. Malcolm obſerves, that the practice of ſolfaing, common as it is, is very uſeleſs and inſignificant either as to the underſtanding or practiſing of muſick, yet exceedingly perplexing. The various applications of the ſeveral names according to the various ſignatures of the clef, are enough to perplex any learner: there being no leſs than 72 different ways of applying the names ſol, fa, &c. to the lines and ſpaces of a particular ſyſtem.

SOLICITOR, or Sollicitor, *Solicitator*, a perſon employed to take care of, and manage ſuits depending in the courts of law and equity; and thoſe of the lower ſort, it is obſerved, are too often made uſe of, to the damage of the people, and the increaſe of champerty and maintenance. Solicitors are within the ſtatute to be ſworn and admitted by the judges, before they are allowed to practiſe in our courts, in like manner as attornies.

There is alſo a great officer of the law, next to the attorney-general, who is ſtiled the king's ſolicitor-general; who holds his office by patent, during the king's pleaſure; has the care and concern of managing the king's affairs, and has fees for pleading, beſides other fees ariſing by patents, &c. He hath his attendance on the privy-council; and the attorney-general and he were anciently reckoned among the officers of the exchequer; they have their audience, and come within the bar in all other courts.

SOLID, in philoſophy, a body whoſe parts are ſo firmly connected together, as not to give way, or ſlip from each other, upon the ſmalleſt impreſſion: in which ſenſe, ſolid ſtands oppoſed to fluid.

Geometricians define a ſolid to be the third ſpecies of magnitude, or that which has three dimenſions, viz. length, breadth, and thickneſs or depth. A ſolid may be conceived to be formed by the revolution, or direct motion of a ſuperficies of any figure whatever, and is always terminated or contained under one or more planes or ſurfaces, as a ſurface is under one or more lines. Solids are commonly divided into regular and irregular. The regular ſolids are thoſe terminated by regular and equal planes, and are only five in number, viz. the tetrahedron, which conſiſts of four equal triangles; the cube or hexahedron, of ſix equal ſquares; the octahedron, of eight equal triangles; the dodecahedron, of 12; and the icoſihedron, of 20 equal triangles.

The irregular ſolids are almoſt infinite, comprehending all ſuch as do not come under the definition of regular ſolids; as the ſphere, cylinder, cone, parallelogram, priſm, parallelopiped, &c.

Solid *Angle*, is that formed by three or more planes meeting in a point, like the point of a diamond well cut.

Solid *Baſtion*. See Bastion.

Solid *Numbers*, are thoſe which ariſe from the multiplication of a plane number by any other whatſoever; as 18 is a ſolid number made of 6 (which is plane) multiplied by 3; or of 9 multiplied by 2.

Solid *Problem*, in mathematicks, is one which cannot be geometrically ſolved, unleſs by the interſection of a circle and of a conick ſection: or, by the interſection of two other conick ſections, beſides the circle. As to deſcribe an iſoſceles-triangle on a given right-line, whoſe angle at the baſe ſhall be triple to that at the vertex.

Line of Solids, on the ſector. See Sector.

Solids, in anatomy, &c. denote the continent parts of the human body; being a congeries of pipes or veſſels, which contain a liquor. The ſolid parts of the body, though equally compoſed of veſſels, are different with regard to their conſiſtence; ſome being hard, and others ſoft. The hard, as the bones and cartilages, give firmneſs and attitude to the body, and ſuſtain the other parts. The ſoft parts, either alone, or together with the hard, ſerve to execute the animal functions.

SOLIDAGO, golden-rod, in botany, a genus of plants, common in gardens; the flowers are yellow, and produced in ſpikes in Auguſt and September; it is eaſily increaſed by parting the roots in October.

The leaves, which have a moderately aſtringent and bitter taſte, are eſteemed good in diarrhœas and dyſenteries, and have been much commended formerly as a reſtorative and vulnerary; and likewiſe for their diuretick and lithontriptick qualities.

SOLIDITY, *Soliditas*, that property of matter, or body, by which it excludes all other bodies from the place which itſelf poſſeſſes.

Among geometricians, the ſolidity of a body denotes the quantity or ſpace contained in it, and is called alſo its ſolid content.

Solidity, in architecture, is applied both to the conſiſtence of the ground whereon the foundation of a building is laid, and to a maſſive in maſonry, of extraordinary thickneſs, without any cavity within.

SOLILOQUY, *Soliloquium*, a reaſoning or diſcourſe which

which a man holds with himfelf; or, more properly, according to Papias, it is a difcourfe by way of anfwer to a queftion that a man propofes to himfelf.

Soliloquies are become very common things on the modern ftage; yet can nothing be more inartificial, or more unnatural, than an actor's making long fpeeches to himfelf, to convey his intentions to the audience. Where fuch difcoveries are neceffary to be made, the poet fhould rather take care to give the dramatick perfons fuch confidants as may neceffarily fhare their inmoft thoughts, by which means they will be more naturally conveyed to the audience: yet is even this a fhift an accurate poet would not be found to have occafion for.

SOLITARIES, a denomination of nuns of St. Peter of Alcantara, inftituted in 1676, the defign of which is to imitate the fevere penitent life of that faint.

SOLO, in mufick, a term ufed in pieces confifting of feveral parts, to mark thofe that are to perform alone.

SOLOMON's SEAL, in botany, the Englifh name of the polygonatum. See POLYGONATUM.

SOLSTICE, in aftronomy, that time when the fun is in one of the folftitial points; that is, when he is at his greateft diftance from the equator, thus called, becaufe he then appears to ftand ftill, and not to change his diftance from the equator for fome time; an appearance owing to the obliquity of our fphere, and which thofe living under the equator are ftrangers to.

The folftices are two in each year, the æftival or fummer folftice, and the hyemal or winter folftice: the fummer folftice is when the fun feems to defcribe the tropick of Cancer, which is on June 22, when he makes the longeft day: the winter folftice is when the fun enters the firft degree, or feems to defcribe the tropick of Capricorn, which is on December 22, when he makes the fhorteft day. See TROPICK.

This is to be underftood as in our northern hemifphere; for in the fouthern, the fun's entrance into Capricorn makes the fummer folftice, and that into Cancer the winter folftice. The two points of the eclipticK, wherein the fun's greateft afcent above the equator, and his defcent below it, are terminated, are called the folftitial points; and a circle, fuppofed to pafs through the poles of the world and thefe points, is called the folftitial colure. The fummer folftitial point is in the beginning of the firft degree of Cancer, and is called the æftival or fummer-point; and the winter folftitial point is in the beginning of the firft degree of Capricorn, and is called the winter point. Thefe two points are diametrically oppofite to each other.

SOLVENT, the fame with diffolvent. See the article DISSOLVENT.

SOLUTION, in chymiftry, denotes an intimate mixture of folid bodies with fluids, fo as feemingly to form one homogene liquor: the diffolving fluid is termed the diffolvent or menftruum.

As to the manner of effecting folutions, it varies according to the different folvents ufed for that purpofe, and is reduced to the following heads by Boerhaave: 1. Solution is performed by water, by diluting, infufing, boiling, diftilling, mixing, fermenting, putrefying, and feparating. 2. With oil, by diluting, infufing, boiling, diftilling, mixing, feparating; but not by fermenting, or by putrefying. 3. With fire, by calcining, roafting, burning, melting, fubliming, mixing, feparating, and promoting feveral other operations. 4. With the affiftance of air, by fermenting, putrefying, agitating, exciting, and adding other parts capable of diffolving. 5. With fermented fpirits, by diluting, infufing, boiling, diftilling, mixing, and making oils thinner. 6. With alkaline falts, by calcining, torrefying, burning, melting, mixing, and feparating, according to the various force of a dry fire employed. 7. By volatile alkaline falts, by fubliming in the dry way; and by diluting, diftilling, and digefting in the moift way. 8. With fixed alkaline falts, affifted and moved by water and fire, by digefting, boiling, diluting, feparating, and mixing. 9. With fixed acid falts, as thofe of alum, fulphur, and vitriol; either feparately in a liquid form, or in their calxes, by diluting, boiling, diftilling, digefting: or in a dry form, by calcining, roafting, burning, and diftilling. 10. With volatile acid falts, by diluting, digefting, diftilling and infinuating. 11. With compound falts and foaps, by calcining, fubliming, diftilling, and digefting, either in a dry or a liquid form. 12. With metals, by fufion and amalgamation.

In pharmacy, however, the principal menftrua are water, vinous fpirits, oils, and acid and alkaline liquors.

Water is the diffolvent of all falts, vegetable gums, and of animal jellies: of the firft it diffolves only a determinate quantity, though of one kind of falt more than another; and being thus faturated, leaves any additional quantity of the fame falt untouched: but it is never faturated with the two latter, uniting readily with any proportions of them, and forming, with different quantities, liquors of different confiftencies. When affifted by trituration, it likewife diffolves the vegetable gummy refins, as ammoniacum and myrrh; the folutions of which, though imperfect, or not tranfparent, but turbid and of a milky hue, are neverthelefs applicable to valuable purpofes in medicine.

Rectified fpirit of wine diffolves the effential oils and refins of vegetables, the pure diftilled oils of animals, and foap; though it does not act upon the expreffed oil and fixed alkaline falt of which foap is made: it alfo, by the affiftance of heat, diffolves volatile alkaline falts, but more efpecially the neutral ones, as the fal diureticus, &c.

Oils diffolve vegetable refins and balfams, wax, animal, mineral bitumens, fulphur, and certain metallick fubftances, particularly lead: however, the expreffed oils are more powerful menftrua for moft of thefe bodies, than the oils obtained by diftillation; becaufe the former are more capable of fuftaining, without injury, a ftrong degree of heat, which, in moft cafes, is neceffary to enable them to act.

Acids diffolve alkaline falts and earths, and metallick fubftances: however, the different acids differ greatly in their action upon thefe laft. The vegetable acids diffolve a confiderable quantity of zinck, iron, copper, and tin; and extract fo much from the metallick part of antimony as to become powerfully emetick: they likewife diffolve lead, if previoufly calcined; but more copioufly, if corroded by their fteam. The marine acid diffolves zinck, iron, and copper; and though it fcarce acts upon any other metallick fubftance, in the common way, may neverthelefs be artfully combined with them all, except gold: fuch is the corrofive fublimate of the fhops. The nitrous acid is the common menftruum of all metallick fubftances, except gold and the antimonial femi-metal, which are foluble only in a mixture of the nitrous and marine acids, called aqua regia. The vitriolick acid eafily diffolves zinck, iron, and copper: and may be made to corrode, or imperfectly diffolve, moft of the other metals.

Alkaline lixivia diffolve oils, refins, and fulphur; but their power is greatly promoted by the addition of quicklime, as is evident in the making of foap and the common cauftícks. Thus affifted, they reduce the flefh, bones, and other folid parts of animals, into a gelatinous matter.

Solutions made in water and in fpirit of wine, poffefs the virtues of the bodies diffolved: whereas oils generally blunt its activity, and acids and alkalies alter natural qualities. Hence watery and fpirituous liquors are the only proper menftrua of the native virtues of vegetable and animal matters. Moft of the foregoing folutions are eafily effected by pouring the menftruum on the body to be diffolved, and fuffering them to ftand together, for fome time, expofed to a fuitable warmth: a ftrong heat is generally neceffary to enable oils and alkaline liquors to perform their office. The action of acids is ufually accompanied with heat, effervefcence, and a copious difcharge of fumes. And as the fumes, which arrive during the diffolution of fome metals in the vitriolick acid, prove inflammable, the operator ought to be careful, left, by the imprudent approach of a candle, the exhaling vapour be fet on fire.

Solution is much facilitated, by powdering fuch tenacious bodies as are friable; and flicing, or rafping, into fmall parts fuch whofe texture does not admit of being powdered: this, in fome cafes, is of fuch importance, that the operation proves extremely tedious, if it be neglected. In folutions of metals, earths, or falts, with acid fpirits, care fhould be taken not to mix them too haftily, otherwife the ebullition will caufe the mixed liquor to overflow the veffels; and, in fome cafes, the unmanageable

manageable heat, together with the noxious fumes, will give the operator great embarraſſment.

But beſides the ſolutions made by adding fluid menſtruums to the bodies to be diſſolved, there is another kind, called deliquiation, or ſolution per deliquium, in which the moiſture of the air is the menſtruum. It is performed by expoſing the matter to be diſſolved to the air, in cellars, or other damp places; for fixed alkaline and neutral ſalts, and ſome metallick ſalts, being thus expoſed, attract its humidity, and at length become liquid. Some ſubſtances, not diſſoluble by the application of water in its groſſer form, as the butter of antimony, are eaſily liquified by this ſlow action of the aerial moiſture.

SOLUTION, in algebra and geometry, is the anſwering a queſtion, or the reſolving any problem propoſed.

SOLUTION *of Continuity*, in ſurgery, is the ſeparation of the natural coheſion of the ſolid parts of the body, by a wound.

SOLUTIVE, an appellation given to laxative and looſening medicines. Solutive tartar is a preparation of tartar, made by boiling eight ounces of cream of tartar with four ounces of fixed ſalt of tartar.

SON, *Filius*, an application given to a male child, conſidered in the relation he bears to his parents.

SONATA, in muſick, a piece, or compoſition, intended to be performed by inſtruments only; in which ſenſe it ſtands oppoſed to cantata, or a piece deſigned for the voice.

SONCHUS, the ſow-thiſtle, in botany; the common ſow-thiſtle flowers in May and June; and becomes a troubleſome weed, if permitted to ſhed its ſeeds. It is full of a milky bitteriſh juice, and is accounted cooling and attenuant; and accordingly is ſometimes preſcribed in the ſtrangury, and alſo in inflammations of all kinds, to be applied externally in the form of a cataplaſm.

SONG, in poetry, a little compoſition, conſiſting of eaſy and natural verſes, ſet to a tune in order to be ſung. The ſong much reſembles the madrigal, and ſtill more the ode, which is nothing but a ſong according to the ancient rules.

SONG, in muſick, is applied in general to a ſingle piece of muſick, whether contrived for the voice or an inſtrument.

SONNET, in poetry, a compoſition contained in 14 verſes, viz. two ſtanzas, or meaſures, of four verſes each, and two of three; the eight firſt verſes being all in three rhimes.

SOOT, *Fuligo*, a volatile matter, ariſing from wood, and other fuel, along with the ſmoke; or rather, it is the ſmoke itſelf, fixed and gathered on the ſides of the chimney.

SOPHISM, in logick, &c. an argument which carries much of the appearance of truth, and yet leads into error.

SOPHIST, a perſon who uſes ſophiſms, with a view to deceive thoſe he would perſuade or convince: ſee the preceding article.

SOPHISTICATION, the adulterating any thing with what is not good or genuine; a practice too common in the making up medicines for ſale; as alſo among vintners, diſtillers, and others, who are accuſed of ſophiſticating their wines, ſpirits, oils, &c. by mixing with them cheaper and coarſer materials: and, in many caſes, the cheat is carried on ſo artfully as to deceive the beſt judges.

SOPORIFICK, or SOPORIFEROUS, medicines, are thoſe capable of procuring ſleep, as opiates, &c.

SORBUS, the ſervice-tree, in botany, a genus of plants whoſe flower conſiſts of five roundiſh concave petals, which are inſerted in the cup, with 20 filaments, topped with roundiſh antheræ.

The fruit of the ſervice is eaten in ſome places; and the wood of the wild ſort is much commended by wheelwrights for being all heart; and it is of great uſe for huſbandmens tools, goads, &c. It is white and ſmooth, and will take a tolerable poliſh.

SORITES, in logick, a ſpecies of reaſoning, in which a great number of propoſitions are ſo linked together, that the predicate of the one becomes continually the ſubject of the next following, till at laſt a concluſion is formed by bringing together the ſubject of the firſt propoſition and the predicate of the laſt.

SORRANCE, among farriers, a malady incident to horſes; of which there are two kinds: 1. An evil counted two-fold, as either an evil ſtate or compoſition of a horſe's body; which is to be obſerved either by the ſhape, number, quantity, or ſight of the member ill affected or diſeaſed. 2. It is uſed for the looſening and diviſion of an unity, which as it may change diverſely, ſo it has divers names accordingly; for if ſuch a looſening and diviſion be in a bone, then it is called a fracture; if in any fleſhy part, a wound or ulcer; if in the veins, a rupture; if in the ſinews, a convulſion or cramp; and if in the ſkin, an excoriation.

Sorrance-water is a ſolution of Roman vitriol and ſome other ingredients, in vinegar: it is much eſteemed as a remedy in many of the diſeaſes of horſes, but eſpecially the ſorrance; whence the name.

SORREL, *Acetoſa*, in botany, a ſpecies of rumex. The common ſorrel is a ſmall plant of the fields, but in gardens it produces large leaves; the leaves are acid and grateful to the ſtomach; they are cool, and quench thirſt; and their decoction makes a uſeful drink in fevers; it is excellent againſt the ſcurvy; and in ſome cold countries they employ a mixture of the juices of ſorrel and ſcurvy-graſs againſt this diſeaſe with ſucceſs.

The round-leaved, or French ſorrel, differs but little from the former, excepting the leaves, which are ſometimes almoſt round; this is the beſt ſort for kitchen uſe, for which purpoſe it is often cultivated in gardens, by parting the roots and planting them about a foot aſunder.

SORREL-COLOUR, in the menage, is a rediſh colour, generally thought to be a ſign of a bad horſe.

SORTILEGE, *Sortilegium*, a ſpecies of divination, performed by means of ſortes or lots. The ſortes præneſtinæ, famous in antiquity, conſiſted in putting a number of letters, or even whole words, into an urn, and then, after ſhaking them together, they were thrown on the ground, and whatever ſentences could be made out from them conſtituted the anſwer of the oracle.

Another kind of ſortes conſiſted in taking ſome celebrated poet, as Homer or Virgil, and opening the book, whatever preſented itſelf firſt to the eye, made the anſwer: and hence it got the name of ſortes Homericæ, and ſortes Virgilianæ, &c. The ſuperſtitious among the ancient Chriſtians practiſed a ſimilar kind of divination, by opening the Old and New Teſtament; whence it got the name of ſortes ſanctorum.

SORY, or RUSMA, in natural hiſtory, a vitriolick mineral, formed of metalline, ſulphureous, and earthy matter; being truly an ore of blue vitriol, or of the vitriol of copper alone, there not appearing to be a grain of any thing approaching to the nature of iron in it.

SOSPIRO, in the Italian muſick, denotes a pauſe equal to the time of a crotchet.

SOTERIA, in antiquity, ſacrifices offered to the gods for delivering a perſon from danger; as alſo poetical pieces compoſed for the ſame purpoſe.

SOUGH, among miners, denotes a paſſage dug under ground, to convey off water from mines.

SOVEREIGN, *Supremus*, ſtrictly ſpeaking, ſignifies the Supreme Being, or God. See GOD.

SOVEREIGN, in matters of government, is applied to the ſupreme magiſtrate, or magiſtrates, of an independant government or ſtate; by reaſon their authority is only bounded by the laws of God, of nature, and the fundamental laws of the ſtate: ſuch are kings, princes, &c.

SOVEREIGN is alſo an appellation given to the ſupreme courts of judicature.

SOUL, *Anima*, in philoſophy, a ſpiritual ſubſtance, which animates the bodies of living creatures: it is the principal of life and activity within them.

Various have been the opinions of philoſophers concerning the ſubſtance of the human ſoul. The Epicureans thought it a ſubtle air, compoſed of their atoms, or primitive corpuſcles. The Stoicks, on the contrary, maintained it was a flame, or portion of heavenly light. And the Carteſians make thinking the eſſence of the ſoul. Others, again, hold, that man is endowed with three kinds of ſoul, viz. the rational, which is purely ſpiritual, and infuſed by the immediate inſpiration of God; the irrational or ſenſitive, which being common to man and brutes, is ſuppoſed to be formed of the elements; and laſtly, the vegetative ſoul, or principle of growth and nutrition, as the firſt is of underſtanding, and the ſecond of animal life.

Lord Bacon obſerves, that there are many excellencies in the human ſoul above thoſe of brutes; and that where

fo many and fuch great excellencies are found, a fpecifick difference fhould always be made. Hence he highly difapproves of the confufed and promifcuous manner of philofophers in treating of the functions of the human foul, as if it differed in degree rather than kind from the fouls of brutes. However, he allows, that the doctrine concerning the rational foul of man muft be deduced from revelation: for as its fubftance, in its creation, was not formed out of the mafs of heaven and earth, but immediately infpired by God; and as the laws of the heavenly bodies, together with thofe of our earth, make the fubject of philofophy, fo no knowledge of the fubftance of the rational foul can be had from philofophy. But he might have faid the fame of corporeal fubftances, fince, as Mr. Locke juftly obferves, we have no idea of one more than of the other.

It is only from the primary, or effential, qualities of body, viz. extenfion, folidity, &c. that we form an idea of it; and why may we not frame the complex idea of a foul, or fpirit, from the operations of thinking, underftanding, willing, &c. which are experiments in ourfelves? This idea of an immaterial fubftance is as clear as that we have of a material one; for though this notion of immaterial fubftances may be attended with difficulties, we have no more reafon to deny or doubt of its truth, than we have to deny or doubt of the exiftence of the body.

That the foul is an immaterial fubftance appears from hence, that the primary operations of willing and thinking have not only no connection with the known properties of body, but feem plainly inconfiftent with fome of its moft effential qualities. For the mind not only difcovers no relation between thinking and the motion and arrangement of parts; but it likewife perceives that confcioufnefs, a fimple act, can never proceed from a compounded fubftance, capable of being divided into many parts. To illuftrate this, let us only fuppofe a fyftem of matter endowed with thought; then either all the parts of which this fyftem confifts, muft think, which would make it not one but a multitude of diftinct confcious beings; or its power of thinking muft arife from the connection of the parts one with another, their motion and difpofition, &c. which, all taken together, contribute to the production of thought.

But it is evident, that the motion of parts, and the manner of combining them, can produce nothing but an artful ftructure and various modes of motion. Hence all machines, however artfully their parts are put together, and however complicated their ftructure, though we conceive innumerable different motions, varioufly combined, and running one into another with an endlefs variety, yet never produce any thing but figure and motion. If a clock, or watch, tells the hour and minutes of the day, it is only by the motion of the different hands, pointing fucceffively at the different figures marked on the hour-plate for that purpofe. We never imagine this to be the effect of thought or intelligence, nor conceive it poffible, by any confinement of ftructure, fo to improve the compofition as that it fhall become capable of knowledge and confcioufnefs; and the reafon is plainly this, that thought being fomething altogether different from motion and figure, without the leaft connection between them, it can never be fuppofed to refult from them.

This, then, being evident, that intelligence cannot arife from an union or combination of unintelligent parts; if we fuppofe it to belong to any fyftem of matter, we muft neceffarily attribute it to all the parts of which that fyftem is compofed; whereby, inftead of one, we fhall, as was before obferved, have a multitude of diftinct confcious beings. And becaufe matter, how far foever we purfue the minutenefs of its parts, is ftill capable of repeated divifions, even to infinity, it is plain, that this abfurdity will follow us through all the fuppofitions that make thought inherent in a material fubftance. Wherefore, as confcioufnefs is incompatible with the cohefion of folid feparable parts, we are neceffarily led to place it in fome other fubftance, of diftinct nature and properties; and this fubftance we call fpirit, which is altogether diftinct from body, nay, and commonly placed in oppofition to it: for which reafon, the beings of this clafs are called immaterial; a word that implies nothing of their true nature, but merely denotes its contrariety to that of matter.

As to the immortality of the human foul, the arguments to prove it may be reduced to the following heads: 1. The nature of the foul itfelf, its defires, fenfe of moral good and evil, gradual increafe of knowledge and perfection, &c. 2. The moral attributes of God.

Under the former of thefe heads it is urged, that the foul, being an immaterial intelligent fubftance, as has been already proved, does not depend on the body for its exiftence; and therefore may, nay, and muft exift after the diffolution of the body, unlefs annihilated by the fame power which gave it a being at firft; which is not to be fuppofed, as there are no inftances of annihilation in nature. This argument, efpecially if the infinite capacity of the foul, its ftrong defire after immortality, its rational activity and advancement towards perfection, be likewife confidered, will appear perfectly conclufive to men of a philofophical turn; becaufe nature, or rather the God of nature, does nothing in vain.

But arguments drawn from the latter head, viz. the moral attributes of the Deity, are not only better adapted to convince men unacquainted with abftract reafoning, but equally certain and conclufive with the former: for as the juftice of God can never fuffer the wicked to efcape unpunifhed, nor the good to remain always unrewarded; therefore, arguments drawn from the manifeft and conftant profperity of the wicked, and the frequent unhappinefs of good men in this life, muft convince every thinking perfon, that there is a future ftate wherein all will be fet right, and God's attributes of wifdom, juftice and goodnefs, fully vindicated. We fhall only add, that had the virtuous and confcientious part of mankind, no hopes of a future ftate, they would be of all men moft miferable: but as this is abfolutely inconfiftent with the moral character of the Deity, the certainty of fuch a ftate is clear to a demonftration.

SOUND, *Sonus*, a fimple perfection, or idea, communicated to the foul by means of the ear, which is the primary organ of hearing. See EAR.

Sound is caufed by an undulatory, or wave-like motion of the air, arifing from the tremulous motion of the parts of any fonorous body when ftruck upon; for thofe undulations, or pulfes of the air, beating on the tympanum or drum of the ear, convey by the auditory nerves the fenfation of found to the mind.

We know by the experiment of the bell in the exhaufted receiver, that found has a neceffary dependence on the air; and if we reflect on the nature of the particles of a fonorous body, and thofe of air, we fhall find that found is nothing but the propagation of the tremors, and the vibrations of the former impreffed on the latter, to the tympanum or drum of the ear, by the action of whofe membrane, they are communicated to the internal cavities of the ear, where the auditory nerve receives the impreffion, and excites the fenfation, in the common fenfory, in the brain.

For the parts of a fonorous body being put in motion by percuffion, vibrate forwards and backwards, through very fmall fpaces, by their elaftick quality. In this action they affect the particles of air contiguous to them, and compel them, upon the firft impulfe, to move forwards alfo; and thefe propel the next, and fo on to a very confiderable diftance, according to the intenfity of the percuffive force. By this means the particles of air are compreffed nearer together than in their natural ftate.

But when the particles of the fonorous body make the fecond part of the vibration, by returning back again, the particles of air alfo, by their repulfive power, repel each other toward their proper places, and thus again expand themfelves.

Now, fince motion, once generated in elaftick bodies, continues fome time before it can be deftroyed by the refiftance and counter-action of contiguous bodies, it follows, that the particles of the fonorous body, and, confequently, thofe of the adjacent air, have, for fome time, a reciprocal vibratory motion, by going forwards and backwards, through very fmall fpaces, in an indefinitely fmall particle of time; which motion gradually decreafes, till it be totally deftroyed.

Hence it is evident that the diftance to which founds may be heard, will be proportional to the magnitude or intenfity of the ftroke made on the tremulous body emitting the found; for, the greater that ftroke is, the greater will be the agitation of the parts of the fonorous body,

and

and, of courſe, the greater will be the force with which they will ſtrike the particles of air. Laſtly, the greater the force is upon the air, the more cloſely will it be condenſed and expanded; hence the greater will be the ſtroke at any given diſtance on the drum of the ear, and, conſequently, the greater will be the diſtance at which the agitation of the air will be ſenſible.

The experiments are numerous by which it has been found, that ſound is audible to the diſtance of 50, 60, or 80 miles; but Dr. Hearne, phyſician to the king of Sweeden, tells us, that at the bombardment of Holmia, in the year 1658, the ſound was heard 30 Sweediſh miles, which make 180 of ours. And in the fight between England and Holland, in the year 1672, the noiſe of the guns was heard even in Wales, which cannot be leſs than 200 miles.

Since the atmoſphere conſiſts not of pure air, but has a mixture of vapours of different elaſticity and tone, theſe vapours will not participate of the motion of pure air, by which ſound is propagated; in like manner, as an elaſtick ſtring ſtruck will not move another very near it, unleſs it be under the ſame degree of tenſion, and of the ſame tone. Therefore the quantity of air producing ſound muſt be diminiſhed in proportion to the quantity of vapour in a given ſpace; in which Sir Iſaac Newton ſuppoſes the air is to the vapour as 10 to one. Whence the air and vapour together, in a given ſpace, are to the pure air as 11 to 10.

But the velocity of the pulſes will increaſe in the ſubduplicate ratio of the diminiſhed quantity of matter, that is, in the ſubduplicate ratio of 11 to 10, or in the entire ratio of 21 to 20; therefore, if we ſay, as 20 : 21 : 1088 : 1142 : whence the real velocity of ſound, thus inveſtigated, from the nature of elaſtick air, by our great author, is at length found to be at the rate of 1142 feet per ſecond.

The truth and accuracy of this noble theory have been ſufficiently confirmed by experiments, particularly thoſe made by the late Rev. Dr. Derham, of which we ſhall give ſome account, but will firſt lay before the reader a view of the different eſtimates made of the velocity of ſound by ſeveral eminent philoſophers, as in the table following:

	Feet per ſecond
The Hon. Mr. Roberts,	1300
The Hon. Mr. Boyle,	1200
Mr. Walker,	1338
Merſennus,	1474
The academy at Florence,	1148
The royal academy at Paris,	1172
Sir Iſaac Newton, Flamſtead, Halley, and Derham,	1142

As no man ever had a better opportunity, ſo none could improve it with greater diligence, aſſiduity, and accuracy, in determining and ſettling the various phænomena of ſounds, than the ſo often celebrated author laſt mentioned. He proved by experiments made with the ſtrokes of a hammer, and the exploſion of a gun at the ſame time, at the diſtance of a mile, that the velocity of ſounds produced from different bodies was the ſame, or came to his ear in the ſame time.

That the motion of ſound was equable and uniform, or that it paſſed through ſpaces proportional to the times, he found by various experiments made by the exploſion of guns, at different diſtances, as appears by the following table which he has given us, where the firſt column ſhews the places at which the guns were fired; the ſecond the number of vibrations of an half-ſecond pendulum; the third the diſtance of places in miles and decimal parts, as meaſured by trigonometry; the fourth the diſtances meaſured by the velocity of ſounds, admitting it to be at the rate of one mile every $9\frac{1}{4}$ half-ſeconds.

At Hornchurch	9	0,9875	
North Okenden church,	$18\frac{1}{2}$	2,004	2,000
Upminſter mill,	$22\frac{1}{2}$ / 23	2,4	2,4 / 2,48
Little Warley church,	$27\frac{1}{2}$	3,0	2,97
Rainham church	$33\frac{1}{4}$	3,58	3,59
Alvel mill,	33	3,58	3,57
Dagenham mill	35	3,85	3,78
Southweall church,	45	4,59	4,86
Eaſt Thornden church,	$46\frac{1}{2}$	5,09	5,03
Barking church,	$70\frac{1}{2}$	7,7	7,62
Guns at Blackheath,	116	12,5	12,55

The great exactneſs of meaſuring diſtances by ſounds appears from the above table, as well as the equability of the motion; but, to render this matter ſtill more certain and indiſputable, the doctor took a journey to Foulneſs-ſands, on the coaſt of Eſſex, which form a ſmooth large plain for miles. On this plain he meaſured ſix miles in a right line, and, cauſing a gun to be fired at the end of each mile, he found that his former obſervations were very juſt and true, and that ſound paſſed the firſt mile in $9\frac{1}{4}$ half-ſeconds, two miles in $18\frac{1}{2}$, three miles in $27\frac{1}{4}$, and ſo on to the end of the ſix.

The Academia del Cimento made experiments of this ſort, from which they concluded, that the velocity of ſounds was ſo far equable, as not to be accelerated or retarded by conſpiring or adverſe winds; but in this they led themſelves and many others into a very great miſtake, which was owing to their firing of guns at too near a diſtance; for in great diſtances the difference is ſenſible.

Sound, in muſick, denotes a quality of the ſeveral agitations of the air, conſidered ſo that their diſpoſition, meaſure, &c. may produce muſick or harmony.

Sound, in geography, implies a ſtreight, or inlet of the ſea, between two head-lands. The famous ſtreight which joins the German ocean to the Baltick, is called, by way of eminence, the Sound.

Sound-Board, the principal part of an organ, and that which makes the whole machine play. The ſound-board, or ſummer, is a reſervoir into which the wind, drawn in by the bellows, is conducted by a port vent, and hence diſtributed into the pipes placed over the holes of the upper part. The wind enters them by valves, which open by preſſing upon the ſtops or keys, after drawing the regiſters which prevent the air from going into any of the other pipes, but thoſe it is required in.

SOUNDING, in navigation, the act of trying the depth of the water, and the quality of the bottom, by a line and plummet, or other artifice. The ſounding-line is the thickeſt and ſhorteſt, as not exceeding 20 fathoms in length; and marked at two, three, and four fathoms, with a piece of black leather between the ſtrands; and at five with a piece of white leather. The ſounding-line may be uſed when the ſhip is under ſail, which the deep ſea-line cannot. The plummet is uſually in the form of a nine-pine, and weighs 18 pounds, the end of which is frequently greaſed, to know whether the ground is ſandy or rocky. Near banks, ſhores, &c. they ſound continually.

SOUR Land, in agriculture, a term uſed by the farmers to expreſs a cold, and ſomewhat wet clayey ſoil.

This muſt have its tilth according to its ſtate and condition, when they ſet about it. If it have a ſtrong ſwarth upon it, then they give it a fallow, by turning it up, when the ſun is in Cancer; this they call a ſcalding fallow, and eſteem it of great uſe, becauſe it kills the graſs roots, and makes the land fine; but if it be light, and have but a thin ſwarth, they leave it for a cooler tillage, and plow it early in the year, when their clay is fallowed. Pigeon's dung and malt-duſt are the moſt proper manures for this ſoil. The malt-duſt is to be ſown with the winter corn, and plowed in with it, for then it lies warm at the roots of the corn all winter.

SOURIS, in the menage, is a cartilage in the noſtrils of a horſe, by means of which he ſnorts.

SOUTH, in coſmography, one of the four cardinal points. See Compass.

SOUTHERNWOOD, *Abrotanum*, in botany, a ſpecies of artemeſia. See Artemesia. The common ſouthernwood is an attenuant, and is ſerviceable in all obſtructions of the viſcera, and in deſtroying worms; it is recommended in ſuppreſſions of urine, and againſt the gravel; alſo it is ſaid to reſiſt poiſons, particularly from the bites of venemous creatures.

SOW, in the iron-works, the name of the block or lump of metal they work at once in the iron furnace.

SOWING, in agriculture and gardening, the acts of ſcattering the ſeed upon the ground, and of dropping it in drills.

SPA, a town in the biſhoprick of Liege, in Germany, famous for its mineral waters. Thoſe of the Pouhon ſpring in Spa are preferred, by our chief phyſicians, to any others in or near the county of Liege.

SPAAD, or SPALT, *Spaltum*, a word ufed in feveral different fenfes; fometimes for a fpecies of Englifh fibrofe talck, or of gypfum, and fometimes for fpar.

SPACE, *Spatium*, a fimple idea, the modes whereof are diftance, capacity, extenfion, duration, &c.

Space, if confidered barely in length between any two beings, is the fame idea that we have of diftance; but if it be confidered in length, breadth, and thicknefs, it is properly called capacity; and when confidered between the extremities of matter, which fills the capacity of fpace with fomething folid, tangible, and moveable, or with body, it is then called extenfion; fo that extenfion is an idea belonging to body only. But fpace, in a general fignification, is the fame thing with diftance, confidered every way, whether there be any folid matter in it or not.

Space, therefore, is either abfolute or relative.

Abfolute SPACE, confidered in its own nature, and without regard to any thing external, always remains the fame, and is immoveable; but relative fpace is that moveable dimenfion or meafure of the former, which our fenfes define by its pofitions to bodies within it: and this the vulgar ufe for immoveable fpace.

Relative SPACE, in magnitude and figure, is always the fame with abfolute, but it is not neceffary it fhould be fo numerically. Thus, if you fuppofe a fhip to be, indeed, in abfolute reft, then the places of all things within her will be the fame abfolutely and relatively, and nothing will change its place. But then fuppofe a fhip under fail, or in motion, and fhe will continually pafs through new parts of abfolute fpace; but all things on board confidered relatively, in refpect to the fhip, may be, notwithftanding, in the fame places, or have the fame fituation and pofition in regard to one another.

SPACE, in geometry, fignifies the area of any figure; or that which fills the interval or diftance between its parameter, or lines that terminate it.

SPAGYRICK, an epithet given to chymiftry, which is called the fpagyrick art, or medicina fpagyrica; and to chymical phyficians, who are fo called fpagyrifts.

SPAHIS, horfemen in the Ottoman army, chiefly raifed in Afia.

SPAN, a meafure taken from the fpace between the thumb's end and the tip of the little finger, when both are ftretched out.

The fpan is eftimated at three hands-breadths, or nine inches.

SPAR, in natural hiftory, a fhining ftony fubftance, generally, though improperly, fuppofed to be compounded of cryftal, incorporated with fome mineral, earthy, ftony, or metallick matter; frequently found in caves and grottos, and in the clefts of rocks, lead-mines, &c.

Spar is naturally pellucid, and is found in almoft an infinite variety of forms; in fome of which it retains its tranfparency and purity, in others it is more or lefs debafed by an admixture of earth, and grows, accordingly, lefs and lefs clear, till, from the marbly hue of fome of the moderately debafed kinds, it finks in fome to a mere earthy appearance. The genuine and diftinguifhing characters of fpar, in whatever form it occurs, are thefe: it will not produce fire when ftruck againft a fteel, it ferments very brifkly with aqua fortis, and, when pure, is totally diffolved by it, and is very readily calcined in a fmall fire.

SPARAGUS, in gardening. See ASPARAGUS.

SPARTIUM, SPANISH BROOM, in botany, a genus of the *diadelphia-decandria* clafs of plants, the corolla whereof is papilionaceous, and the fruit is a long, cylindrick, obtufe pod of two valves: the feeds are numerous, globofe, and kidney-fhaped.

SPARTIUM is alfo Tournefort's name for the genifta of Linnæus, as genifta is Linnæus's name for Tournefort's fpartium. See BROOM.

SPASM, the fame with convulfion, which fee.

SPASMODICK, convulfive, fomething belonging to a fpafm or convulfion.

SPATHA, among botanifts, a kind of flower-cup, which confifts of a membranaceous matter growing to the ftalks of fome certain flowers.

SPATULA, an inftrument ufed by furgeons, &c. for mixing and fpreading plaifters, and for many other ufes.

SPAVIN, a difeafe of horfes; a fwelling or ftiffnefs ufually in the ham, which caufes him to halt. There are two kinds of fpavins, viz. the

Ox SPAVIN, which is a callous tumour at the bottom of the ham, on the infide; hard as a bone, and very painful. While it is yet young, fome horfes only halt with it, at the firft coming out of the ftable.

Dry SPAVIN, which is more eafily perceived by the horfe's raifing one of his hind legs, with a twitch, higher than the other; fometimes it is found on both legs. This kind, which fome alfo call ftring-halt, frequently degenerates into the ox fpavin; for which there is no remedy but to apply the fire; which, however, is not always fuccefsful. There are two other kinds of fpavin which have their feat in the hoof, viz. the

Blood SPAVIN, a foft tumour which grows through a horfe's hoof, and is ufually full of blood.

Bone SPAVIN, a crufty fubftance growing on the infide of the hoof under the joint.

SPAWS, mineral waters arifing out of the earth, tinged with nitre, fulphur, allum, bitumen, copperas, or other mineral matter, in paffing through the ftrata thereof; and hence endued with fome medicinal quality, cathartick, diuretick, emetick, alterant, or the like.

SPAYING, or SPADING, the operation of caftrating the females of feveral kinds of animals, as fows, bitches, &c. to prevent any further conception, and promote their fattening.

SPEAKER *of the Houfe of Commons*, a member of the houfe elected by a majority of the votes thereof, to act as chairman or prefident, in putting queftions, reading briefs or bills, keeping order, reprimanding the refractory, adjourning the houfe, &c.

The firft thing done by the commons, at the firft meeting of a parliament, is to chufe a fpeaker, who is to be approved of by the king, and who, upon admiffion, begs his majefty, that the commons during their fitting, may have free accefs to his majefty, freedom of fpeech in their own houfe, and fecurity from arrefts.

The fpeaker is not allowed to perfuade or diffuade, in paffing of a bill; but only to make a plain and fhort narrative; nor to vote, unlefs the houfe be equally divided. The lord chancellor, or keeper, is ufually fpeaker of the houfe of lords. The fpeaker of the convocation is called the prolocutor.

SPEAKING, the art or act of expreffing one's thoughts in articulate founds or words.

SPEAKING-*Trumpet*. See STENTOROPHONICK *Tube*.

SPECIAL, fomething that is particular, or has a peculiar defignation; from the Latin, *fpecies*, in oppofition to general, of *genus*.

SPECIALITY, in law, is moft commonly taken for a bond, bill, or other like inftrument in writing. Sometimes it is alfo ufed for a fpecial or particular acquaintance.

SPECIES, an idea which relates to fome other more general one; or is comprifed under a more univerfal divifion of a genus.

Species is a mere term of relation: and the fame idea may be a fpecies, when compared to another more general one; and a genus, with regard to a more particular one. Thus, body is a genus, with regard to an animate and inanimate body; and a fpecies with regard to fubftance.

SPECIES, in logick, is one of the five words called by Porphyry univerfalis.

SPECIES, in rhetorick, is a particular thing, contained under a more univerfal one.

SPECIES, in opticks, the image painted on the retina, by the rays of light reflected from the feveral points of the furface of an object.

SPECIES, in commerce, are the feveral pieces of gold, filver, copper, &c. which, having paffed their full preparation and coinage, are current in publick.

SPECIES, in algebra, the characters or fymbols made ufe of to reprefent quantities.

SPECIFICK, in philofophy, that which is peculiar to any thing, and diftinguifhes it from all others.

SPECIFICK, in medicine, a remedy, whofe virtue and effect is peculiarly adapted to fome certain difeafe, is adequate thereto, and exerts its whole force immediately thereon. The illuftrious Hoffman has given a curious account of fpecifick medicines, but it is too long to be inferted here.

SPECIFICK *Gravity*, is that by which one body is heavier

vier than another of the fame dimenfion, and is always as the quantity of matter under that dimenfion.

Thus a cubical inch of iron is heavier than a cubical inch of wood; for the particles which compofe the iron being more folid, and more clofely compacted together; or, which is the fame, having fewer interftices, or vacuities between them, than thofe of the wood; there is actually more matter contained under the fame dimenfions in iron than wood; and, therefore, is faid to be fuperficially heavier than wood. And for the method of finding the fpecifick gravity of bodies, fee the article HYDROSTATICK BALANCE.

SPECILLUM, or SPECULUM, an inftrument ufed by furgeons for fearching and dilating wounds.

SPECIOUS ARITHMETICK, that managed and performed by fymbols; now generally called algebra. See ALGEBRA.

SPECTACLES, an optick machine, confifting of two lenfes fet in horn, &c. to affift the defects of the organ of fight.

SPECTATOR, a perfon prefent at a fpectacle.

SPECULARIS LAPIS, in natural hiftory, a kind of foffile ftone, pellucid like glafs. It is a fpecies of talck, and fplits eafily into thin laminæ or plates.

SPECULUM, *Mirror*, in opticks, any polifhed body impervious to the rays of light; fuch as water in wells and deep rivers, polifhed metals, and glaffes lined with mercury, or other opaque matter, popularly called looking-glafs. See MIRROR, BURNING-GLASS, and *Burning*-GLASS.

SPECULUM, among furgeons, a probe or inftrument for dilating the natural paffages or cavities.

SPEECH, the art or act of expreffing a perfon's thoughts by certain figns invented for that purpofe.

SPEECH, in grammar, denotes an affemblage of feveral words ranged in order. The grammarians generally make eight parts of fpeech, i. e. eight kinds of words, generally ufed in difcourfe, viz. noun, pronoun, verb, participle, adverb, prepofition, interjection, and conjunction; each of which fee under its proper article.

F. Buffier, one of the laft and beft writers of grammar, only admits of three parts of fpeech, viz. noun, verb, and modifier, which laft includes the adverb, prepofition, and conjunction.

SPELLING, that part of grammar, commonly called orthography. See ORTHOGRAPHY.

SPELTER. See ZINK.

SPERM, the feed whereof an animal is formed.

SPERMA-CETI, in pharmacy, a white flaky fubftance, prepared from the oil of a fpecies of whale, called by ichthyologifts catodon, by reafon it has teeth only in the under jaw.

The ignorance of the people who firft ufed this medicine, gave it a name which feemed to exprefs its being the femen of the whale; but it is, in reality, no more than a preparation of the oil, with which that fifh abounds.

Sperma-ceti is a fine, bright, white, and femi-pellucid fubftance, compofed of a fine furfuraceous fubftance, formed into oblong flakes, very light, foft, and unctuous to the touch, inflammable, foluble in oil, but not in watery menftrua; of fcarce any fmell, when frefh and fine, and of a foft, agreeable, and unctuous tafte. The largeft, firmeft, and whiteft flakes of it are to be chofen. It is liable to become rancid and yellowifh in keeping, and the fmaller fragments contract this bad quality fooner than the larger.

The fperma-ceti of the fhops was firft made from the head of this fifh; the oil obtained from its brain, and the diploe of the cranium, furnifhing all that we had of it; and hence the confiderable price it was long kept at. It was fome time after found out, however, that any whale-oil would do as well as this, which occafioned the price to fall confiderably. At prefent it is made in England from whale-oil of any kind, the fettlings of our oilmen's larger veffels particularly, which are boiled with a lixivium of german pot-afh, or pearl-afhes, till white and firm; and after feveral other meltings, and a thorough feparation of what faline particles might have got into the matter, it is, when cold, cut out with knives into the flakes we fee it in. The procefs is eafy, but it requires care, and a nice infpection towards the end: if not enough boiled, it is apt to turn yellow, and foon grow rancid. Sperma-ceti is, therefore oil of the animal kind, rendered very fweet, and fit for internal ufe. Its virtues are emollient and pectoral; it is good in coughs, and other diforders of the breaft; and excellent in external applications, fuch as liniments, and the like: it readily diffolves in oil, or other fatty fubftances, for the latter purpofes; and, for the former, it blends with the yolk of an egg, and after that mixture with an aqueous fluid, and makes a pleafant emulfion.

SPERMATICK, an epithet for the organs of generation, and the refpective parts thereof.

SPERMATICK *Veffels*, called alfo vafa præparantia, are veffels appointed for bringing the blood to the tefticles.

SPERMATICK *Arteries*, arife from the fore part of the trunk of the aorta below the emulgens.

SPERMATOCELE, in medicine and furgery, the fame with the cirfocele, or hernia varicofa. See the article CIRSOCELE.

SPHACELUS, in furgery and medicine, a total corruption or mortification of any part, occafioned by an interception of the blood and fpirits. Sphacelus is diftinguifhed from a gangrene, which is only a mortification begun, and, as it were, the road to a fphacelus.

If a gangrene degenerates into a fphacelus, the part infected muft be removed; but the method of doing this is to be varied, according as the part is totally, or only partially affected, and according to the fituation of the part, which fometimes does not admit of amputation, as the buttocks, os facrum, os coccygis, the prominent fpines of the vertebræ, and eminencies of the fcapulæ.

If the part is not corrupted to the very bottom, or cannot be extirpated, our endeavours muft tend, firft, to ftop the progrefs of the fphacelus; and fecondly, to remove the fphacelated portion.—The progrefs is ftopped by intercepting the communication betwixt the live and fphacelated parts.

In the part thus mortified, all the humours remain at reft in the veffels, or, the veffels being ruptured, the humours are difcharged, and become ftagnant; but fo long as the cohefion between the mortified part remains, the fluids conveyed through thefe veffels, which are, as yet, alive, will ftop in the part where the fphacelus begins, and, confequently, the motion will be fuffocated in the live parts contiguous to that which is mortified; and thus the diforder will be propagated.

The infected part is feparated, if, after the progrefs of the diforder is ftopped, or whilft it is ftopping, the whole part is cauterifed, or cut, to the found fubjacent parts, and then corroded by the application of a warm acrid lixivium, till it is confumed to the live parts, till efchars are formed, which are carefully to be foftened and removed; but the live parts muft, at the fame time be avoided with the greateft caution.

The corrofive lixivium, recommended by Boerhaave for procuring the feparation of a fphacelus, is prepared thus:

Take of quick-lime made of calcined ftones, one part. Cover it carefully up with three parts of pot-afh, and, when they are diffolved in a fubterraneous place, filtrate and keep the preparation for ufe. Quick-lime itfelf, reduced to a powder, may alfo be fprinkled on the part.

But feperations are moft advantageoufly made, if the mortified efchars, by the application of a putrefying remedy, fo as to be diffolved into a foft mafs, recede from the found part, whilft the live parts are, in the mean time, cherifhed with enlivening fomentations.

When the meafures above recommended will not produce the defired effect, we muft proceed to amputation. See AMPUTATION.

SPHENOIDAL SUTURE, in anatomy, a future thus called from its encompaffing the os fphenoides, which it feparates from the os frontis, the os petrofum, and the os occipitis.

SPHENOIDES, or OS CRUCIFORME, in anatomy, the feventh bone of the cranium, or fkull. This bone is fixed in manner of a wedge among the other bones of the cranium, and ferves as a bafis, as it were, to fupport feveral of them, and fome of thofe of the upper jaw: the figure of this bone is very irregular; in its upper part is feen the fella equina, or turcica, under which there is a finus: this is fometimes double, and opens into the noftrils: fometimes it is totally wanting: it is called the fphenoidal finus.

SPHENOPHARYNGÆUS, in anatomy, a pair of mufcles, called alfo the pterygopharingæus. See the article PTERYGOIDEUS.

SPHENOSTAPHYLINUS, in anatomy, a muſcle of the larynx. It deſcends from a round fleſhly origination, near the root of a proceſs of the os ſphenoides, and from thence runs obliquely to the uvula, and is inſerted into its hinder and upper part, where it joins its partner. It ſerves to draw the uvula upwards and backwards, and hinders the maſticated aliment from paſſing into the foramina narium, in deglutition.

SPHERE, *Sphæra*, is a ſolid contained under one uniform round ſurface, ſuch as would be formed by the revolution of a circle, about a diameter thereof as an axis.

Properties of the SPHERE. 1. All ſpheres are to one another as the cubes of their diameters. 2. The ſurface of a ſphere is equal to four times the æra of one of its great circles, as is demonſtrated by Archimedes in his book of the Sphere and Cylinder, lib. 1. prop. 37. hence to find the ſuperficies of any ſphere, we have this eaſy rule; let the area of a great circle be multiplied by 4, and the product will be the ſuperficies: or, according to Euclid, lib. vi. prop. 20. and lib. xii. prop. 2. the area of a given ſphere, is equal to that of a circle, whoſe radius is equal to the diameter of the ſphere. Therefore, having meaſured the circle deſcribed with the radius, this will give the ſurface of the ſphere. 3. The ſolidity of a ſphere is equal to the ſurface multiplied into one third of the radius: or, a ſphere is equal to two thirds of its circumſcribing cylinder, having its baſe equal to a great circle of the ſphere.

SPHERE, in aſtronomy, that concave orb, or expanſe, which inveſts our globe, and in which the heavenly bodies appear to be fixed, and at an equal diſtance from the eye.

The better to determine the places of the heavenly bodies in the ſphere, ſeveral circles are ſuppoſed to be deſcribed on the ſurface thereof, hence called the circles of the ſphere; of theſe, ſome are called great circles, as the equinoctial, eclíptick, meridian, &c. and others, ſmall circles, as the tropicks, parallels, &c. See each under its proper article.

Armillary SPHERE. See ARMILLARY *Sphere*.

SPHERE *of Activity of a Body*, is that determinate ſpace or extent, to which, and no farther, the effluvia continually emitted from that body, reach; and where they operate according to their nature. See POWER.

SPHERICKS, is that part of geometry which treats of the poſition and menſuration of arches of circles, deſcribed on the ſurface of a ſphere.

SPHEROID, in geometry, a ſolid, approaching to the figure of a ſphere, and generated by the entire revolution of a ſemi-ellipſis about either its tranſverſe or conjugate axis. When the figure is generated by the revolution of the ſemi-ellipſis, about its tranſverſe, or greater axis, it is called a prolate, or oblong ſpheroid. And, when generated by the revolution of a ſemi-ellipſis, about its conjugate or leſs diameter, it is called an oblate ſpheroid. Every ſpheroid is equal to $\frac{2}{3}$ of its circumſcribing cylinder.

SPHINCTER, in anatomy, a term applied to a kind of circular muſcles, or muſcles in form of rings, which ſerve to cloſe and draw up ſeveral orifices of the body, and prevent the excretion of the contents: thus the ſphincter of the anus cloſes the extremity of the inteſtinum rectum.

SPHINX, in ſculpture, &c. a figure or repreſentation of a monſter of that name, famed among the ancients, now moſtly uſed as an ornament in gardens, terraces, &c. It is repreſented with the head and breaſts of a woman, the wings of a bird, the claws of a lion, and the reſt of the body like a dog. It is ſuppoſed to have been engendered by Typhon, and ſent by Juno to be revenged on the Thebans. Its office, they ſay, was to propoſe dark enigmatical queſtions to all paſſers by; and if they did not give the explication thereof, to devour them. It made horrible ravages, as the ſtory goes, on a mountain near Thebes, and could not by any means be deſtroyed, till after Œdipus had ſolved the following riddle: "What animal is it that in the morning walks on four "legs, at noon on two, and at night on three?" The anſwer was "Man."

Among the Egyptians, the ſphinx was the ſymbol of religion, by reaſon of the obſcurity of its myſteries: and on the ſame account the Romans placed a ſphinx in the porch of their temples.

SPICA VIRGINIS, a ſtar of the firſt magnitude, in the conſtellation Virgo.

SPIDER, *Aranea*, in zoology, an inſect of a roundiſh or elliptick figure, having eight eyes placed on the hinder part of the thorax, and having alſo eight legs. This creature has a power of ſpinning.

The ſpecies of ſpiders are very numerous; but authors have made them more ſo, by admitting among them other inſects of a very different genera.

SPIDER-WORT, *Phalangium*, in botany, a genus of plants whoſe flower conſiſts of ſix oblong, blunt, ſpreading petals; and ſix ſubulated erect filaments, topped with ſmall incumbent furrowed antheræ. The fruit is a ſmooth, ovate, three furrowed capſule, containing a number of angulated ſeeds. This genus is comprehended among the anthericums by Linnæus.

SPIEL, in the glaſs trade, an iron inſtrument, hooked at the end and pointed, with which the workmen take the metal up out of the melting-pots, for proofs or eſſays, to ſee whether it be fit for work.

SPIGELIA, worm-graſs, in botany, a genus of plants whoſe flower is monopetalous and funnel-ſhaped; natives of North America, and is much eſteemed there for its efficacy in deſtroying worms, for which purpoſe it has been long uſed by the inhabitants of Braſil, and alſo by the negroes, who taught the inhabitants of the Britiſh iſlands in America the uſe of it.

SPIGNEL, *Meum*, in botany, a genus of umbelliferous plants, the general corolla of which is uniform. The partial one conſiſts of five inflexocordated, unequal petals. There is no pericarpium. The fruit is oblong, ſtriated, and diviſible in two parts. The ſeeds are two; oval, ſtriated, convex on one ſide, and plane on the other. This genus is called athamanta by Linnæus.

The root of ſpignel is uſed in medicine. It is about the thickneſs of the little finger, branched, and covered with a bark of a ferruginous colour; but is pale within, a little gummous, and contains a whitiſh pith. It ſmells almoſt like parſnips, though more aromatick; and the taſte is not diſagreeable, though it is acrid and a little bitter. It is dry and carminative, expelling wind, and helping the cholick and gripes: it is alſo alexipharmick, and good againſt peſtilential diſtempers, being an ingredient in the theriaca and mithridate: it is alſo reckoned good againſt the ſtone, and for ſtoppages of the urine.

SPIKE, or *Oil of* SPIKE, a name given to an eſſential oil diſtilled from lavender, and much uſed by the varniſh makers, and the painters in enamel, and of ſome uſe in medicine.

SPIKENARD, *Nardus*, in botany. See NARDUS.

SPINA BIFIDA, in anatomy, a parting of the ſpinal proceſſes into two rows: the exiſtence of ſuch a caſe is doubted.

SPINA VENTOSA, in ſurgery and medicine, that ſpecies of corruption of the bones which takes its riſe in the internal parts, and by degrees enlarges the bone, and raiſes it into a tumour, and which, when it happens to children, is termed by Severinus, and many others, pædarthrocaces.

SPINACH, or SPINAGE, *Spinacia*, in botany, a genus producing male and female flowers on different plants. The male flower has no corolla; but the cup is divided into five oblong, obtuſe, concave ſegments; and contains five capillary filaments, topped with oblong twin antheræ. The cup of the female flower is divided into four parts. The corolla is wanting. It contains a roundiſh compreſſed germen, which ſupports four capillary ſtyles, which are each crowned with a ſingle ſtigma. The ſeed is incloſed in the cup; and is either of a roundiſh form, or armed with two or three thorns.

There are two kinds of ſpinach cultivated in gardens for culinary purpoſes; and are diſtinguiſhed by gardeners by the title of prickly ſpinach, and round leaved ſpinach. They are both propagated from ſeeds: the former is ſown in Auguſt for winter and ſpring uſe, which when come up, ſhould be hoed out about three or four inches diſtance, and, if neceſſary, repeated a ſecond time, and by having a ſufficient quantity, will be fit for uſe all the winter, obſerving to crop the larger leaves as they are wanted. The other ſort of ſpinach has rounder leaves, and the ſeeds are without prickles: this is not ſo hardy as the winter ſort; it is therefore more commonly ſown in the ſpring, on an open ſpot of ground, and when the plants are up ſhould be hoed out as the former; but as they ſoon run up to ſeed, and are then unfit for uſe, it

it is therefore neceffary for their longer continuance to fow at four different feafons in the fpring, viz. January, February, March, and April, after which time they run to feed almoft as foon as the plants are up, particularly in dry weather.

Spinach is faid to temperate acrid bilious humours in the firft paffages; but as it is watery, fome correct it with falt, pepper, and other fpices. It does not yield much nourifhment; but it is not unwholfome, and generally keeps the body open.

It is not ufed in medicine, except in counterfeiting the colour of fome things of value, as particularly giving to Gafcoign's powder the fame colour as is given by bezoar.

SPINALIS, in anatomy, the names of feveral mufcles, &c. of the fpine, but more particularly that of a mufcle on the fide of the neck, arifing from the five fuperior proceffes of the vertebræ of the thorax, and the inferior of the neck; and which in its afcent, becoming more flefhy, is inferted into the inferior part of the vertebræ of the neck laterally. It ferves to draw the neck backwards.

SPINDLE, in the fea-language, is the fmalleft part of a fhip's capftan, which is betwixt the two decks. The fpindle of the jeer-capftan has whelps to heave the viol. The axis of the wheel of a watch or clock, is alfo called the fpindle. Among miners, the fpindle is a piece of wood faftened into either ftow blade.

SPINE, Spina Dorsi, in anatomy, the body column reaching from the head down to the anus; being the feries or affemblage of vertebræ which fuftain the reft of the body, contain the fpinal marrow, and to which the ribs are connected.

SPINET, or Spinnet, a mufical inftrument ranked in the fecond or third place among harmonious inftruments. It confifts of a cheft or belly made of the moft porous and refinous wood to be found, and a table of fir glued on flips of wood, called fummers, which bear on the fides. On the table is raifed two little prominences or bridges, wherein are placed fo many pins as there are chords or ftrings to the inftrument. It is played on by two ranges of continued keys, the former range being the order of the diatonick fcale, and that behind, the order of the artificial notes or femi-tones. The keys are fo many flat pieces of wood, which touched and preffed down at the end, make the other raife a jack which ftrike and found the ftrings by means of the end of a crow's quill wherewith it is armed. The thirty-firft ftrings are of brafs, the other more delicate ones of fteel or iron-wire; they are all ftretched over the two bridges already mentioned. The figure of the fpinet is a long fquare or parallelogram; fome call it an harp-couched, and the harp an inverted fpinet.

SPINNING, in commerce, the act or art of reducing filk, flax, hemp, wool, hair, or other matters, into thread. Spinning is either performed on the wheel with a diftaff and fpindle, or with other machines proper for the feveral kinds of working. Hemp, flax, nettle-thread, and the like vegetable matters, are to be wetted in fpinning; filks, wools, &c. are to be fpun dry, and do not need water; but there is a way of fpinning filk as it comes off the cafes or balls, where hot and even boiling water is to be ufed.

SPINOSE Leaves, among botanifts are thofe whofe furfaces or edges are armed with cartilaginous points, and fo firmly affixed, that they cannot be feparated without injuring the body of the leaves: fuch are thofe of the holly-tree, &c.

SPINOZISM, or Spinosism, the doctrine of Spinoza, or atheifm and pantheifm propofed after the manner of Spinoza, who was born a Jew at Amfterdam.

The great principle of fpinozifm, is that there is nothing properly and abfolutely exifting befides matter and the modifications of matter; among which are even comprehended thought, abftract and general ideas, comparifons, relations, combinations of relations, &c.

SPINSTER, in law, an addition ufually given to all unmarried women from the vifcount's daughter downwards; but, according to Sir Edward Cooke, generofa is a good addition for a gentlewoman; and that if fuch a perfon be named fpinfter in any original writ, appeal, or indictment, fhe may abate and quafh the fame.

SPIRAL, in geometry, a curve line of the circular kind, which, in its progrefs, recedes from its centre.

2

A fpiral, according to Archimedes, its inventor, is thus generated: if a right line, as A B (*plate* LXXVI. *fig.* 17.) having one end fixed at B, be equally moved round, fo as with the other end A to defcribe the periphery of a circle; and, at the fame time, a point be conceived to move forward equally from B towards A, in the right-line B A, fo as that the point defcribes that line, while the line generates the circle: then will the point, with its two motions, defcribe the curve-line B 1, 2, 3, 4, 5, &c. which is called the helix or fpiral line; and the plane fpace, contained between the fpiral line and the right line B A, is called the fpiral fpace.

If alfo you conceive the point B to move twice as flow as the line A B, fo as that it fhall get but half way along the line B A, when that line fhall have formed the circle; and if then you imagine a new revolution to be made of the line carrying the point, fo that they fhall end their motion at laft together, there will be formed a double fpiral line, and the two fpiral fpaces, as you fee in the figure. From the genefis of this curve, the following corollaries may be eafily drawn. 1. The lines B 12, B 11, B 10, &c. making equal angles with the firft and fecond fpiral (as alfo B 12, B 10, B 8, &c.) are in arithmetical proportion. 2. The lines B 7, B 10, &c. drawn any how to the firft fpiral, are to one another as the arches of the circle intercepted between B A and thofe lines. 3. Any lines drawn from B to the fecond fpiral, as B 18, B 22, &c. are to each other as the aforefaid arches, together with the whole periphery added on both fides. 4. The firft fpiral fpace is to the firft circle as 1 to 3. And, 5. The firft fpiral line is equal to half the periphery of the firft circle; for the radii of the fectors, and confequently the arches, are in a fimple arithmetick progreffion, while the periphery of the circle contains as many arches equal to the greateft; wherefore the periphery to all thofe arches is to the fpiral lines as 2 to 1.

Spiral, in architecture and fculpture, implies a curve that afcends, winding about a cone or fpire, fo as all the points thereof continually approach the axis. It is diftinguifhed from the helix, by its winding around a cone, whereas the helix winds in the fame manner around a cylinder.

Proportional Spirals, are fuch fpiral lines as the rhumb lines on the terreftrial globe, which, becaufe they make equal angles with every meridian, muft alfo make equal angles with the meridians in the ftereographick projection on the plane of the equator; and therefore will be proportional fpirals about the polar point.

SPIRE, *Spira*, in architecture, was ufed by the ancients for the bafe of a column, and fometimes for the aftragal or tore. But, among the moderns, it denotes a fteeple that continually diminifhes as it afcends, whether conically or pyramidally.

SPIRIT, *Spiritus*, in metaphyficks, an incorporeal being or intelligence; in which fenfe, God is faid to be a fpirit, as are angels and the human foul.

Spirit, in chymiftry, a name applied to feveral very different fubftances; however, in general, it denotes any diftilled volatile liquor that is not infipid, as phlegm, or pure water, nor inflammable as oil: but under this general idea are comprehended liquors of quite oppofite natures, fome being acid, and others alkaline; which laft are fuch enemies to the former, that as foon as they are put together they raife a violent effervefcence, and grow hot: and to thefe may be added a third fort, called vinous or inflammable fpirits; which though very fubtile and penetrating, are not manifeftly either acid or alkaline.

SPIRITS, or Animal Spirits, in phyfiology. See Animal *Spirits*.

SPIRITUAL, in general, fomething belonging to, or partaking of, the nature of fpirit.

SPIRITUALITIES *of a Bifhop*, are the profits that he receives as a bifhop, and not as a baron of parliament; fuch are the duties of his vifitation, prefentation-money, what arifes from the ordination and inftitution of priefts, the income of his jurifdiction, &c.

SPITTLE, *Saliva*, in phyfiology. See Saliva.

SPLEEN, *Lien*, in anatomy, a foft fpongy vifcous, fituated in the left hypochondrium, under the diaphragma between the ribs and the ftomach, above the left kidney. It is tied to the peritonæum, to the medriff, and to the omentum: it is of a bluifh or leaden colour, of an oblong figure, thick at the edges, and not thin at the liver.

liver. It has two membranes. The external comes from the peritonæum. The internal membrane is finer and thinner than the external: for, if you blow into the fplenick artery, the air fhall pafs through the one, but not the other. Its fibres are not irregularly woven, as thofe of the other membranes feem to be; but they come from innumerable points, as rays from fo many centres, and the fibres of one point are regularly woven with the fibres of the point furrounding it. It receives veins, nerves, and arteries from thofe that enter the fpleen. The fubftance of the fpleen is not only kept together by its two membranes, but alfo by innumerable fibres which come from the points of the internal membrane, and are inferted in the points of the oppofite fide of the fame membrane: the expanfion of the extremity of thefe fibres feems to compofe the internal membrane. The fpleen is compofed of an infinity of membranes, which form little cells and cavities of different figures and bignefs, which communicate with one another, and which are always full of blood. At the extremities of the blood-veffels in the fpleens of fheep, we find feveral fmall, white, and foft fpecks, which Malpighi calls glands. The fpleen has arteries from the cœliack, whofe capillary branches make frequent inofculations upon the membranes of the cells. Its veins, whofe extremities communicate with the cavities of the cells, as they come out of the fpleen, unite and make the ramus fplenicus of the vena portæ, which carries the blood from the fpleen of the liver. Thefe, with its nerves, which are confiderable from the plexus fplenicus, are equally diftributed through the whole fubftance of the fpleen, being all included in a common capfula. There are likewife a few lymphatick veffels which arife from the fpleen, and difcharge them into the lumbary glands.

The fpleen, being always full of a dark-coloured blood, was by the ancients thought to be the receptacle of the arta bilis, a humour no where to be found. And all that has been faid about its ufe by the moderns, has been to little fatisfaction, till Dr. Keil taught us thus to reafon thereon:

We muft confider that the bile is compofed of particles, which flowly combine and unite together, and that by reafon of the vicinity of the liver to the heart, and of the fwift motion of the blood through the aorta, thefe particles could not in fo fmall a time, and with fo great a velocity, have been united together, had not the blood been brought through the coats of the ftomach, inteftines, and omentum, by the branches of the vena portæ, to the liver. But, becaufe all thefe parts were not fufficient to receive all the blood which was neceffary to be fent to the liver, therefore nature framed the fpleen, into whofe cavities the blood being poured from a fmall artery, moves at leaft as flowly as any that paffes otherwife to the liver; by which means the particles which compofe the bile in the blood which paffes through the ramus fplenicus, by a long and flow circulation, have more chances for uniting them, which otherwife they could not have had, had they been carried by the branches of the cœliack artery directly to the liver; and confequently without the fpleen, fuch a quantity of bile as is now fecerned, that is, as nature requires, could not have been fecerned by the liver. And this he takes to be the true ufe of the fpleen.

Spleen is alfo ufed for a difeafe by phyficians more ufually called the hypochondriack difeafe.

SPLENETICK, a perfon affected with oppilations and obftructions of the fpleen. In fplenetick people, the fpleen is fwelled beyond the natural bulk, or hardened fo as to fhew a ferous tumour thereon.

Splenetick *Veffels*, a large artery and vein of the fpleen.

SPLENII Musculi, alfo from their fhape called triangulares, in anatomy, are mufcles that arife from the four upper fpines of the vertebræ of the back, and from the two lower of the neck, and, afcending obliquely, adhere to the upper tranfverfe proceffes of the vertebræ of the neck, and are inferted into the upper part of the occiput. They pull the head backwards to one fide.

SPLENT, among farriers, a callous infenfible excrefcence, or griftle, that fometimes fticks to the horfe's fhank bone; generally on the infide, below the knee. If there be one oppofite thereto on the outfide, it is called a pegged or pinned fplent, becaufe it does, as it were, pierce the bone, and is very dangerous: fome call this a double fplent, and others a thorough fplent.

Splents, in furgery, pieces of wood ufed in binding up broken limbs.

SPLICE, at fea. They fay a cable or rope is fpliced, when the feveral ftrands of each end, being untwifted, are wrought into one another in a peculiar manner known to all feamen.

SPODIUM. See Cadmia.

SPOILS, *Spolia*, whatever is taken from an enemy in war. Among the Greeks the fpoils were divided in common among the whole army; only the general's quota was the biggeft.

SPONDEE, in the Greek and Latin profody, a foot of verfe confifting of two long fyllables: as *vertunt*.

SPONGIOSA, in anatomy, an epithet given to feveral parts of the body by reafon of this texture, which is porous and cavernous, like that of the fponge.

SPONTANEOUS, in the fchools, is a term applied to fuch motions of the body and mind as we perform of ourfelves, without conftraint.

SPORADES, in aftronomy, a name which the ancients gave to fuch ftars as were not included in any conftellation. Thefe the moderns more ufually call informes, or extraconftellary ftars. Many of the fporades of the ancients have been fince formed into new conftellations: e. gr. of thofe between Leo and Urfa Major, Hevelius has formed a conftellation, called Leo Minor; of thofe between Urfa Minor and Auriga, the fame perfon has formed another conftellation, called Lyorx, &c.

SPORADICK, is ufed for fuch difeafes as reign in the fame place and time.

SPOTS, in aftronomy, a dark place obferved in the difk or face of the fun, moon, and planets. See Maculæ.

SPOUT, or *Water* Spout, in natural hiftory, an extraordinary meteor, or appearance at fea, and fometimes at land, very dangerous to fhips, &c. called by the Latins typho and fepho, and by the French trompe.

Its firft appearance is in form of a deep cloud, the upper part whereof is white, and the lower black. From the lower part of this cloud hangs, or rather falls down, what we properly call the fpout, in manner of a conical tube, biggeft at top. Under this tube is always a great boiling and flying up of the water of the fea, as in a jet d'eau. For fome yards above the furface of the fea, the water ftands as a column or pillar, from the extremity whereof it fpreads and goes off, as in a kind of fmoke. Frequently, the cone defcends fo low, as to touch the middle of this column, and continue for fome time contiguous to it; though fometimes it only points to it, at fome diftance, either in a perpendicular or oblique line. Frequently it is fcarce diftinguifhable, whether the cone or the column appear the firft, both appearing all of a fudden againft each other. But fometimes the water boils up from the fea to a great height, without any appearance of a fpout pointing to it, either perpendicularly or obliquely. Indeed, generally, the boiling or flying up of the water has the priority, this always preceding its being formed into a column. Generally, the cone does not appear hollow, till towards the end, when the fea-water is violently thrown up along its middle, as fmoke up a chimney. Soon after this, the fpout or canal breaks and difappears; the boiling up of the water, and even the pillar, continuing to the laft, and for fome time afterwards; fometimes till the fpout form itfelf again, and appear anew; which it fometimes does feveral times in a quarter of an hour. M. de la Pyme, from a near obfervation of two or three fpouts in Yorkfhire, defcribed in the Philofophical Tranfactions, gathers that the water-fpout is nothing but a gyration of clouds by contrary winds, meeting in a point or centre; and there, where the greateft condenfation and gravitation is, falling down into a pipe or great tube, fomewhat like Archimedes's fpiral fcrew; and, in its working and whirling motion, abforbing and raifing the water, in the fame manner as the fpiral fcrew does; and thus deftroying fhips, &c. Thus, June the 21ft, he obferved the clouds mightily agitated above, and driven together; upon which they became very black, and were hurried round, whence proceeded a moft audible whirling noife, like that ordinarily heard in a mill. Soon after iffued a long tube or fpout, from the centre of the

congregated clouds, wherein he obferved a fpiral motion, like that of a fcrew, by which the water was raifed up. Again, Auguft 15, 1687, the wind, blowing at the fame time out of feveral quarters, created a great vortex and whirling among the clouds; the centre whereof, every now and then, dropped down, in fhape of a long, thin, black pipe, wherein he could diftinctly behold a motion like that of a fcrew, continually drawing upwards, and fcrewing up, as it were, whatever it touched. In its progrefs it moved flowly over a grove of trees, which bent under it like wands in a circular motion. Proceeding, it tore off the thatch from a barn, bent a huge oak-tree, broke one of its greateft branches, and threw it to a great diftance. He adds, that whereas it is commonly faid, the water works and rifes in a column, before the tube comes to touch it; this is doubtlefs a miftake, owing to the finenefs and tranfparency of the tubes, which do moft certainly touch the furface of the fea, before any confiderable motion can be raifed therein; but which do not become opaque and vifible till after they have imbibed a confiderable quantity of water.

The diffolution of water-fpouts he afcribes to the great quantity of water they have glutted; which by its weight impeding their motion, whereon their force, and even exiftence, depends, they break and let go their contents, which ufually prove fatal to whatever is found underneath.

A notable inftance hereof we have in the Philofophical Tranfactions, related by Dr. Richardfon: a fpout in 1718, breaking on Emott-moor, nigh Coln, in Lancafhire, the country was immediately overflowed; a brook, in a few minutes, rofe fix feet perpendicularly high; and the ground whereon the fpout fell, which was 66 feet over, was tore up to the very rock, which was no lefs than feven feet deep; and a deep gulph made for above half a mile; the earth being raifed on either fide in vaft heaps.

In Pliny's time, the feamen ufed to pour vinegar into the fea, to affuage and lay the fpout when it approached them; our modern feamen keep it off, by making a noife with filing and fcratching violently on the deck, or by difcharging great guns to difperfe it.

SPRING, *Fons*, in natural hiftory, a fountain or fource of water arifing out of the ground.

The origin of fprings, or fountains, is a thing greatly controverted among naturalifts. There are however but three hypothefes of any tolerable repute relating to this queftion: all others, it is allowed by every body, are not worth mentioning, much lefs the trouble of confuting.

The firft hypothefis is that of Des Cartes, who was of opinion, that the water of the fea diffufed itfelf in all directions, under ground, and that, coming to the bottom of mountains, it there met with large caverns, into which, being rarified by the central heat beneath, it afcended in vapours, leaving its faline parts behind, as being fuperficially heavier; that thefe vapours, being impeded in their afcent by the tops of the caverns, condenfed there, forming little ftreams or currents of water, like the fteam in the head of an alembick.

But this hypothefis is far from being agreeable to truth; for, in the firft place, it is begging the queftion to fuppofe any fuch free paffages of communication betwixt the fea and the bafes of mountains; nor can any experiment be produced to warrant the fuppofition of thefe fubterraneous channels; on the contrary, wherever running waters have been difcovered in the bowels of the earth, it has been obferved, that they run the contrary way, viz. from the mountains to the fea.

But let us grant that the waters have a free paffage from the fea, for 2 or 300 leagues, to the bafes of high mountains; where are the furnaces which remain in fuch a conftant ftate of readinefs and heat, to rarify thefe waters, and make them evaporate in clouds? But let us ftill further allow, that there is a fufficient degree of heat for this purpofe; yet where are thofe caverns 6 or 700 paces high, whofe cool vaults are to condenfe thefe exhaled vapours? It is certain that people have digged and penetrated far enough into the bowels of the earth and mountains, to make the difcovery, but without ever finding caverns big enough to allow the vapours a free afcent to the height of the fountains from whence the rivers derive their fource. Befides, a concurrence of all thefe vapours could not produce the leaft ftream of frefh water; for the vapours adhering to the fide of the caverns, and there condenfing, not finding any receptacle to receive them, and from whence they might iffue out through the fides in fprings, muft confequently fall down again into the bafon from whence they arofe: fo that thefe wonderful alembicks, with which Des Cartes feems fo highly delighted, are only mere fancies, having no exiftence in nature.

The fecond hypothefis fuppofes that the fea-water percolates through the pores of the earth, which, though large enough for the fluid to permeate, yet are fo fmall as to deny admittance to the faline particles which are commixed with them; which the water, during the courfe of its filtration, leaves behind, thus refining and purifying itfelf, till it becomes frefh and potable, before it mixes with the fountains and rivers.

But this hypothefis is no lefs abfurd than the former; for what can become of the falt which fo many rivers muft have depofited under ground? It is now about 6000 years, that the fea, according to this hypothefis, has been diftributing out its waters and falts to the fource of rivers, without having received in return from them any other than frefh water; and confequently it would have happened, by degrees, either that the fea muft have emptied itfelf of all its falts, or the earth have been fo overcharged with them, as that thefe falts would have blocked up thofe fubterraneous channels the water fhould pafs through, in order to fupply the fountains.

It has been found by repeated experiments, that a pound of falt water will yield four drachms of falt, and confequently a cubick foot of water, which weighs near 70lb. will produce 3lb. of falt; but, that our calculation may be allowed moderate and unexceptionable, we will fay only 2lb. Now the celebrated Dr. Halley, by an unexceptionable calculation, found that the quantity of water which paffes daily through the Thames, is above 76,032,000 cubick feet: and confequently the quantity of falt daily depofited in the bowels of the earth, before it arrives to the fources of that river, muft be 152,064,000lb. or above 678,857 tons. We have hitherto taken but one river into our account; but, if we add thofe of the whole earth, what prodigious quantities of falt muft be daily amaffed in the bowels of the earth! a few years will be fufficient to render thofe maffes bigger than the mountains themfelves, and the earth muft conftantly increafe and fwell with thefe additional fupplies of matter.

The third hypothefis owes its origin to that fagacious naturalift, Dr. Edmund Halley, and is as follows: it is evident from experience, that there perpetually arifes a vapour from the furface of the fea, rivers, and lakes; this vapour is carried through the atmofphere in the form of a cloud or mift, by the impulfe of winds; and, according as it meets with a colder air, or is ftopped in its progrefs by mountains, it condenfes, and falls down in dew, fnow, or rain; the water, in whichfoever of thefe fhapes it defcends, finds feveral chinks and crannies, through which it infinuates itfelf into the main body of the hills or mountains, where it is lodged in beds of ftone or clay, according to the nature of the foil; and by degrees, increafing its ftore and ftrength, it forces its way through the firft outlet it meets with, and takes the name of a temporal or perennial fountain, according to the capacity of the bafon which fupplies it current.

This beautiful hypothefis, which has been received with univerfal applaufe and fatisfaction by the learned world, we fhall endeavour to demonftrate by the two following propofitions: 1. That the vapours which arife from the fea are much more than fufficient to fupply both the furface of the earth and the rivers with water. 2. That the mountains do, by their particular ftructure and formation, attract, and, as it were, arreft the vapours and the rain that fluctuate about in the atmofphere; and, having collected them in their refervoirs, difmifs them again through their fides, either in perpetual or intermitting currents.

With regard to the firft, the ingenious author of this theory made the following experiment: he took a veffel of water, and made it of the fame degree of faltnefs with that of the fea, by means of the hydrometer. And, having placed a thermometer in it, he brought it, by means of a pan of coals, to the fame degree of heat with that of the air in the hotteft fummer. He then placed this

this vessel with the thermometer in it in one scale, and nicely counterpoised it with weights in the other: after two hours, he found, that about the 60th part of an inch was gone off in vapour, and consequently in 12 hours, the length of a natural day, $\frac{1}{10}$ of an inch would have been evaporated.

From this experiment it follows, that every ten square inches of the surface of the water yield a cubick inch of water in vapour per day, every square mile 6914 tons, and every square degree (or 69 English miles) 33 millions of tons. Now, if we suppose the Mediterranean to be 40 degrees long, and 4 broad, at a medium, which is the least that can be supposed, its surface will be 160 square degrees, from whence there will evaporate 5280 millions of tons per day, in the summer-time.

The Mediterranean receives water from the nine great rivers following, viz. the Iberus, the Rhine, the Tyber, the Po, the Danube, the Neister, the Borysthenes, the Tanais, and the Nile; all the rest being small, and their water inconsiderable. Now let us suppose that each of these rivers conveys ten times as much water to the sea as the Thames; but we have already observed that the Thames yields daily 76.032,000 cubick feet, which is equal to 203 millions of tons; and therefore all the nine rivers will produce 1827 millions of tons; which is little more than one third of the quantity evaporated each day from the sea. The prodigious quantity of water remaining the doctor allows to rains, which fall again into the seas, and for the uses of vegetation, &c.

Having shewn that the quantity of vapours is abundantly sufficient to supply the rivers with water, we shall proceed to shew in what manner it is collected in the bowels of the mountains, so as to form the different kinds of springs which we meet with in nature.

The tops of mountains in general abound with inequalities, cavities, open reservoirs, subterraneous grottos, gaping, and, if we may so call them, disjointed cells. Their pointed summits, which seem to pierce the clouds, stop those vapours, which fluctuate in the atmosphere, and being constipated thereby, they precipitate in water, and by their gravity easily penetrate through beds of sand and lighter earth, till they are stopped in their descent by more dense strata, as beds of clay, stone, &c. where they form a bason or cavern, and work a passage horizontally, and issue at the side of the mountain.

Many of these springs running down by the vallies, between the ridges of hills, and uniting their streams, form rivulets or brooks; and many of these again uniting on the plain, become a river.

Reciprocating SPRINGS, or those which flow and ebb alternately, are occasioned in the following manner: let A B C D (*Plate* LXXVI. *fig.* 18.) represent a reservoir, fed by the stream O, whose water flows into another reservoir, I K L, through the syphon M N, and at the same time has another stream at W falling into the same reservoir, whose outlet or spring is at Y. This spring will reciprocate or flow and ebb; for when the syphon M N works, the surface of the water at Y will be suddenly raised, and press upon the water at K with a greater force, and consequently it will issue out with a greater velocity, and raise the surface, if confined: but, when the syphon intermits, the momentum will be less, and then the stream will ebb or decrease.

SPRING, *Ver*, in cosmography, implies one of the seasons of the year; commencing, in the northern parts of the world, on the day the sun enters the first degree of Aries, which is about the twenty-first of March, and ending when the sun leaves Gemini. Or more strictly and generally, the spring begins on the day, when the distance of the sun's meridian altitude from the zenith, being on the encreasing hand, is at a medium between the greatest and the least.—The end of the spring coincides with the beginning of summer.

SPRING, elasticity, in physicks. See ELASTICITY.

SPRING, *a Mast*. So the seamen call it, when a mast is cracked, splintered, or split, but not broke in any part.

SPRING-*Tide*. The time of spring-tides is always about three days before the full or change of the moon; but the top or highest, which is the spring tide, is three days after the full or change; then the water runs highest with the flood, and lowest with the ebb, and the tides run more strong and swift than in the neaps. See TIDE.

SPRINGY, or elastick bodies, are such as, having had their figure changed by the stroke or percussion of another body, can recover again their former figure, which bodies that are not elastick will not do.

SPUNGE, in natural history, a plant of so very singular a structure, that many authors have supposed it not merely a vegetable, but of an intermediate nature between that and the animal kind, and have ranked it among the number of an imaginary race of beings, which they call zoophytes. Spunge, however, is a genuine plant; nor is there in the creation any such class of being as zoophytes, or any creature that is partly plant, partly animal.

We meet with spunge in the shops, often in the whole plant; sometimes only in pieces of larger ones; in either case, it is of a perfectly irregular figure, and is only to be distinguished by its texture, which is cavernous, like that of a honeycomb; its elasticity, which makes it, after passing into a very small compass, immediately expand to its full bulk again, on taking away the pressure; and by its property of imbibing perfectly a large quantity of water, and as readily parting with it again, on squeezing.

Spunge is to be chosen perfectly clean, and free from stones within, or from a crustaceous and hard matter without; of as pale a colour as may be, and with small holes, and such as is lightest.

The greatest part of the spunge we use is brought from Aleppo and Smyrna. It grows in the Archipelago, at considerable depths, on the rocks about some of the islands there, and multitudes of people make a trade of diving for it. It is also common in the Mediterranean, and many other seas, though, in general, browner or yellower, and not so fine as that of the Archipelago. It grows in large masses to rocks or stones, sometimes to large shells: and is sometimes round, sometimes flat, sometimes hollow, like a funnel. It is one of the cryptogamiæ of Linnæus, one of the harbæ marinæ of Tournefort, and one of the herbæ imperfectæ of Mr. Ray. It is described by all the botanical writers under the name of spongia marina alba, and spongia globosa, the white or round spunge. Distilled by a retort, it yields a large quantity of white milky phlegm, of a fishy smell; after this a large portion of an urinous redish liquor, with a little of a dry, volatile, urinous salt, and a thick, brownish, fœtid oil. The remainder in the retort yields only a small portion of a lixivial salt, and that not merely alkaline.

Spunge calcined to a blackness, and reduced to powder, has been lately brought into great use as a sweetener of the blood, and a diuretick; some have pretended even to cure leprosies with it, and others have extolled it against the bite of a mad dog; but these are virtues less certainly known of it. In the larger and coarser pieces of spunge, there are often small stones found imbedded in the substance of the matter, and yet, more frequently, a crustaceous matter gathered round the surface of certain parts of the plants: both these substances are called by the common name of lapis spongiæ, the spunge stone; and both are recommended as diureticks, and remedies against the stone and gravel.

Pyrotechnical SPUNGES, are made of the large mushrooms, or fungous excrescences growing on old oaks, ashes, firs, &c. which being boiled in common water, then dried and well beaten, are put into a strong lye prepared with salt-petre, and again dried in an oven. These make the black match or tinder brought from Germany, used to receive and sustain the fire struck from a flint and steel, &c.

SPUNGE, is also used in gunnery, for a long staff or hammer with a piece of sheep or lamb skin wound about its end, to serve for scouring great guns, when discharged, before they are charged with fresh powder.

SPUNGING, in gunnery, the cleaning a gun's inside with a spunge, in order to prevent any sparks of fire from remaining in her, which would endanger the life of him who should load her again.

SPUN-YARN, among sailors, is a kind of line made from rope-yarn, and used for seizing or fastening things together.

SPUR, a piece of metal, consisting of two branches encompassing a horseman's heel, and a rowel in form of a star, advancing out behind to prick the horse.

SPUR-WAY, a road through another's ground, through which one may ride by right or custom.

SPURGE, *Tithymalus*, in botany, a genus of plants, according to Tournefort, but comprehended among the euphorbias by Linnæus. The common ſpurge, which grows wild in gardens, &c. is full of a milky juice, which applied to the ſkin, corrodes it into a ſcar, and is therefore uſed by beggars to excite compaſſion: it is ſeldom uſed in any medicinal forms; but the common people uſe it to eat off warts, which it will do by frequent application, if the cruſt which hardens on them be cut off between whiles.

Spurge-Laurel, in botany, a ſpecies of daphne.

SPURIOUS Diseases, ſuch as, in ſome ſymptoms, cannot be reduced to any one kind; and therefore are denominated from thoſe with which they agree in moſt particulars: thus we ſay, a ſpurious or baſtard pleuriſy, quinzy, &c.

SPURKETS, in a ſhip, ſpaces between the upper and lower futtocks, or between the rungs fore and aft.

SPUTUM, among phyſicians, denotes the ſame with the ſaliva, or ſpittle. See Saliva.

SPY, a perſon hired to watch the actions, motions, &c. of another: particularly of what paſſes in a camp. When a ſpy is diſcovered, he is hanged immediately.

SQUADRON, in military affairs, denotes a body of horſe, whoſe number of men is not fixed, but is uſually from one to two hundred.

Squadron *of Ships*, a diviſion or part of a fleet, commanded by a vice-admiral, or commodore.

SQUAMMOUS, *Squammoſus*, in anatomy, an epithet given to the ſpurious or falſe ſutures of the ſkull, becauſe compoſed of ſquammæ or ſcales like thoſe of fiſhes, or like tiles laid ſo as to reach over one another.

SQUARE, *Quadratum*, in geometry, a quadrilateral figure, both equilateral and equiangular. To find the area of a ſquare, ſeek the length of one ſide; multiply this by itſelf, the product is the area of the ſquare.

Square *Number*, the product of a number multiplied into itſelf. Thus 4, the product of 2, multiplied by 2, or 16, the product of 4, multiplied by 4, are ſquare numbers.

Square *Root*, a number conſidered as the root of a ſecond power or ſquare number, or a number, by whoſe multiplication into itſelf, a ſquare number is generated. See Extraction.

Square *Battle*, or battalion of men, is one that hath an equal number of men in rank and file.

Hollow Square, in the military art, is a body of foot drawn up with an empty ſpace in the middle for the colours, drums, and baggage; faced and covered by the pikes every way to keep off horſe.

SQUILLA. See Scilla.

SQUINACY, or eſquinacy. See Quinsey.

STACK *of Wood*, among huſbandmen, is a pile of three feet long, as many broad, and 12 feet high.

STADIUM. See Aulos.

STADTHOLDER, Stadthoulder, or Statholder, a governor or lieutenant of a province in the United Netherlands, particularly that of Holland, where the word is moſt uſed, by reaſon of the ſuperior importance of the government of that province.

STAFF, in muſick, five lines on which, with the intermediate ſpaces, the notes of any ſong or piece of muſick are marked.

Staff, in ſurveying, a kind of ſtand whereon to mount a theodolite, circumferenter, plain table, or the like, for uſe. It conſiſts of three legs of wood joined together at one end, whereon the inſtrument is placed, and made peaked at the other to enter the ground. Its upper end is uſually fitted with a ball and ſocket.

STAGE, in the modern drama, the place of action and repreſentation, included between the pit and the ſcenes. The ſtage anſwers to the proſcenium or pulpitum of the ancient theatre.

Laws of the Stage, are the rules and decorums to be obſerved with regard to the œconomy and conduct of a dramatick performance to be exhibited on the ſtage. Theſe relate, principally, to the unities, the diſpoſition of the acts and ſcenes, the unravelling, &c.

STAGGERS, in the menage. See the article Stavers.

STAIR-CASE, in building, an aſcent incloſed between walls, or a balluſtrade, conſiſting of ſtairs or ſteps, with landing-places and rails, ſerving to make a communication between the ſeveral ſtories of a houſe; and ſometimes it is uſed to ſignify the whole frame of a pair of ſtairs only.

The conſtruction of a complete ſtair-caſe, ſays Sir Henry Wotton, is one of the moſt curious works in architecture, and the common rules are theſe that follow:

1. That it have a full free light, to prevent accidents of ſlipping, falling, &c.

2. That the ſpace over-head be large and airy, which the Italians call un bel sfogolo, i. e. good ventilation, becauſe a man ſpends much breath in mounting.

3. That the half paces or landing places be conveniently diſtributed for repoſing by the way.

4. That to avoid rencounters, and alſo to gratify the eye of the beholder, the ſtair-caſe be not too narrow; but this laſt is to be regulated by the quality of the building; and that, in royal buildings, the principal aſcent be at leaſt 10 feet. For a little ſtair-caſe in a great houſe, and a great one in a little houſe, are both equally ridiculous.

5. That great care be taken in the placing the ſtair-caſe, ſo that the ſtairs may be diſtributed without prejudice to the reſt of the building, there being much nicety required in making this choice.

Stairs, in building, the ſteps whereby we aſcend and deſcend from one ſtory of an houſe to another.

As to the dimenſions of ſtairs, they are differently aſſigned by different authors; but, however, they agree in this, that they muſt not be more than ſix, nor leſs than four inches high; nor more than 18, nor leſs than 12 inches broad; nor more than 16, nor leſs than ſix feet long each ſtair.

But theſe meaſures have only reſpect to large and ſumptuous buildings; for in common and ordinary houſes, they may be ſomething higher and narrower, and much ſhorter; yet even in theſe, the ſtairs are not to exceed ſeven, or, at moſt, eight inches in eight; for if they do, they will be difficult to aſcend; neither ought they to be leſs than nine or 10 inches in breadth, nor ought their length to be leſs than three.

Of making Stairs. Though there have been rules laid down for the height and breadth of ſtairs, yet workmen are not to be ſo ſtrictly tied up to thoſe rules, as not in the leaſt to vary from them; for they muſt always obſerve to make all the ſtairs of the ſame ſtair-caſe of an equal heighth and breadth; in order to which, they muſt firſt conſider the height of the room, and alſo the width and compaſs they have to carry up the ſtairs in.

Then, in order to find the height of each particular ſtair, they ought firſt to propoſe the height, and to divide the whole height of the room by the propoſed height; which being done, the quotient will ſhew the number of ſtairs; but if the diviſion does not fall out exact, but that there be a remainder, then, in this caſe take the quotient (without regarding the remainder) for the number of ſtairs, and by that number divide the whole height of the room, ſo the quotient will give you the exact height of each ſtair; as for example:

Suppoſe the whole height of the room to be nine feet, three inches, and ſuppoſe you deſigned to make each ſtair ſix inches high; turn the whole height of the room into inches, which will be 111 inches: divide theſe by 6, the quotient will be 18, and 3 remaining: there let the number of ſtairs be 18, and by it divide 111, and the quotient will be $6\frac{3}{18}$, or $6\frac{1}{6}$ inches, which muſt be the exact height of each ſtair.

Then, to find the breadth of each ſtair, divide the width or compaſs (that you have to carry them up in) by the number of ſtairs, and the quotient will give the exact breadth of each ſtair.

STALACTITES, or Stagonites, in natural hiſtory, a ſparry ſort of icicles, which often hang down from the tops or arches of grottos and ſubterranean caverns; and from the roofs of buildings, and capitals of pillars of ſuch places as are built over hot ſprings.

STALE, the urine of cattle.

STALK, in botany, that part of a plant which riſes immediately from the root, and which ſupports the leaves of the flowers and the fruit. The term ſtalk is uſed on all occaſions; but in ſpeaking of the graſſes and gramineous plants, the word culm is uſed in its place, to diſtinguiſh that peculiar kind of ſtalk which is general to all theſe plants, and is not found in any others.

STALKING, a term uſed in fowling, and applied to

to a kind of ſcreen, or device, to hide the fowler and amuſe the game, while he gets within ſhot.

STAMINA, among botaniſts, are the male organs of generation in flowers, and defined by Linnæus as an entrail of a plant deſigned for the preparation of the pollen or male duſt. Each ſingle ſtamen conſiſts of two parts, a filament and antheræ; though ſometimes the filament is wanting.

By the conſtruction, number, and diſtribution of the ſtamina, Linnæus's ſyſtem of botany is principally founded and regulated thereby. Tournefort takes the uſe of the ſtamina to be as it were ſo many excretory canals for diſcharging the growing embryo of its redundant juices; and of theſe excrements of the fruit, he takes that farina or duſt found in the antheræ to be formed: but other writers, as Geoffrey, and Linnæus in particular, aſſign the ſtamina a nobler uſe. Theſe authors explain the generation of plants in a manner analogous to that of animals; they maintain the uſe of the ſtamina to be that of ſecreting in their fine capillary canals a juice which being collected, hardened, and formed into a farina, or duſt, in the tips of the apices, is thence, when the flower is arrived to maturity, diſcharged by the burſting of the apices or antheræ on the top of the piſtil, whence is a paſſage for it to deſcend into the uteris or germen; where being received, it impregnates and fœcundifies that part which is deſtined for the fruit and ſeeds.

STAMINA, in the animal body, are defined to be theſe ſimple original parts which exiſted firſt in the embryo, or even in the ſeed, and by whoſe diſtinction, augmentation, and accretion, by additional juices, the animal body, at its utmoſt bulk, is ſuppoſed to be formed.

STAMINEOUS, in botany, a term uſed by authors, for thoſe flowers of plants which have no petals or flower-leaves, but conſiſt only of a number of ſtamina and piſtils, placed in a cup. This cup is ſometimes miſtaken for a flower, and its leaves thought to be true petals, but they remain when the ſtamina are fallen, and become the capſules, containing the ſeed; which, according to Tournefort, is the true character of a cup, not of a flower.

STAMP DUTIES, certain impoſitions laid on all parchment and paper, on which deeds, grants, or other inſtruments, or any proceſs in law or equity, are ingroſſed or written. The ſtamp duties are alſo extended to almanacks, news-papers, pamphlets, cards and dice. All pamphlets above a ſheet, and under ſix ſheets in octavo, 12 in quarto, or 20 in folio, are ſubject to a ſtamp-duty.

STAMPS, in metallurgy, a ſort of large peſtles, lifted up by water-wheels, to pound ores, &c.

STAMPING-MILL, or knocking-mill, an engine uſed in the tin works to bruiſe the ore ſmall.

STANDARD, in war, a ſort of banner or flag borne as a ſignal for the joining together the ſeveral troops belonging to the ſame body.

The ſtandard is uſually a foot of ſilk, a foot and a half ſquare, on which is embroidered the arms, device, or cypher of the prince or the colonel. It is fixed on a lance eight or nine feet long, and are carried in the centre of the firſt rank of a ſquadron of horſe. The ſtandard is uſed for any material enſign of horſe, but more particularly for that of the general, or the royal ſtandard. Thoſe borne by the foot are rather called colours.

STANDARD, in commerce, the original of a weight, meaſure, or coin, committed to the keeping of the magiſtrate, or depoſited in ſome public place, to regulate, adjuſt, and try the weights uſed by particular perſons in traffick.

STANDARDS, or *Standeles*, in huſbandry, are young trees reſerved, at the ſelling of woods, for the growth of timber.

STANNARIES, *Stannaria*, the mines and works where tin is dug and purified, as in Cornwall, Devonſhire, &c. There are four courts of the ſtannaries in Devonſhire, and as many in Cornwall; and ſeveral liberties granted them by acts of parliament, in the time of Edward I. &c. though ſomewhat abridged under Edward III. and 17 Car. I. c. 15.

STANZA, in poetry, a certain ſtated number of grave verſes, containing ſome perfect ſenſe, terminated with a reſt or pauſe.

STAPES, in anatomy, a little bone ſituate in a cavity of the feneſtra ovalis; thus called from its reſembling a ſtirrup. See EAR.

STAPLE, *Stapula*, primarily ſignifies a public place or market, whither merchants, &c. are obliged to bring their goods to be bought by the people: as the Greve, or the places along the Seine, for the wines and corns of Paris; whither the merchants of other parts are obliged to bring thoſe commodities.

STAPLE, alſo ſignifies a city or town where merchants jointly agree to carry certain commodities, as wool, cloth, lead, tin, &c. in order to their being commodiouſly ſold by the great. In England, ſtaples are ſettled and appointed to be conſtantly kept at York, Lincoln, Newcaſtle upon Tyne, Norwich, Weſtminſter, Canterbury, Chicheſter, Wincheſter, Exeter, and Briſtol, to which places merchants and traders were to carry goods to ſell in theſe parts.

The ſtaple commodities of England are chiefly wool, leather, cloth, tin, lead, &c. though by ſtaple goods is now meant any proper ſaleable commodities not eaſily ſubject to periſh.

STAR, *Stella*, in aſtronomy, a general name for all the heavenly bodies. The ſtars are diſtinguiſhed from the phænomena of their motion, &c. into fixed and erratick.

Erratick, or *wandering* STARS, are thoſe whoſe diſtances and places vary, with regard to each other, and are otherwiſe called planets. See PLANET.

Fixed STARS, called alſo, by way of eminence, ſtars, are thoſe which continually keep the ſame diſtance with regard to each other.

The different apparent magnitudes of the ſtars are owing to their different diſtances from us. An ordinary teleſcope in ſeveral parts of the heavens, diſcovers ten times as many ſtars as are viſible to the naked eye. Dr. Hook ſays, that, with a teleſcope of 12 feet, he told 78 ſtars among the Pleiades, and with a more perfect teleſcope he was able to ſee a great many more. Antonius Maria de Rheita affirms, that he counted 2000 in the conſtellation Orion. The galaxy, or milky way, owes its whiteneſs to a prodigious number of ſtars too ſmall to appear diſtinct to the naked eye. So that we have reaſon to believe, that only that infinitely wiſe and powerful Being, who created them, is able to tell the number of the ſtars, and to call them all by their names.

Mr. Whiſton, in his aſtronomical lectures (lect. 4.) from the obſervations of Dr. Hook and Mr. Flamſtead, computes, that the greateſt annual parallax, or that which a ſtar in the pole of the elliptick would have, is 47″; from whence he finds the diſtance of the ſtars to be about 9000 ſemi-diameters of the orbit of the earth, or 500000000000 miles; a prodigious diſtance this: but Dr. Bradley, by a ſeries of accurate obſervations, has diſcovered that the parallex does not amount to two ſeconds. Therefore the diſtance of the fixed ſtars will be 20 times greater than by the foregoing calculation. An amazing diſtance! and beyond the power of imagination to reach. It has been found that a cannon-ball, at its firſt diſcharge, moves at the rate of about ſeven miles and a half in a minute; and that the velocity of ſound is about thirteen miles in a minute. According to this computation, a cannon- all, ſuppoſing it to continue the ſame velocity as at its firſt diſcharge, would be 8,600,000 years, and the ſound would be 4,800,000 years in moving from us to the fixed ſtars. Even light itſelf, whoſe prodigious velocity is about 17000 miles in a ſecond, would be above ſix years in paſſing from the fixed ſtars to us.

The twinkling of the fixed ſtars is owing to the exceeding ſmallneſs of their apparent diameters, occaſioned by their immenſe diſtance; ſo that every little particle of duſt that floats in the air, when it comes in a right line between the ſtar and the eye, will eclipſe it; and as the air is full of various kinds of particles, ſome of them are conſtantly paſſing between the eye and the ſtar, and, conſequently, cauſe the ſtar to twinkle. The ancients tell us, that the appearance of a new ſtar induced Hipparchus to make a catalogue of them. Theſe appearances have been often obſerved: but the moſt remarkable is that which appeared in November 1572, in Caſſiopeia. This ſtar was ſeen for fixteen months ſucceſſively, without any change of place among the fixed ſtars: it had neither hair round it, nor tail, as comets have; but ſhone with the ſame luſtre as the other fixed ſtars, ſurpaſſing Sirus

Sirus or Lyra, in brightneſs and magnitude. It appeared even bigger than Jupiter, which, at that time, was near his perigee: and by ſome was thought to equal Venus, when in her greateſt luſtre: it ſhone ſhorth all at once in its greateſt ſplendour, and continued the ſame all November, ſo as to be ſeen, by thoſe who had good eyes, even at noon-day; and at night it might be perceived through thin clouds, which obſcured the other ſtars. It did not continue long of the ſame apparent magnitude; for in December it ſeemed equal to Jupiter, and in January leſs than that planet, but bigger than ſtars of the firſt magnitude. Thus it gradually decreaſed till March, 1574, when it intirely diſappeared.

Catalogue of the STARS. See CATALOGUE.

Cloudy STARS, are ſmall luminous ſpots in the heaven, ſome of which appear to the naked eye like dim ſtars, ſurrounded by an hazy light; others like little whitiſh clouds, nearly reſembling the milky way in brightneſs and colour. Theſe are in general an aſſemblage of ſtars too ſmall to be apparent to the naked eye, but form lucid ſpots by the aſſemblage of their rays. The two remarkable whitiſh ſpots near the ſouth pole called Magellanick clouds, and, when viewed by the naked eye, exactly reſemble the milky way, were diſcovered by Dr. Halley to be a mixture of ſmall clouds and ſmall ſtars.

The fixed ſtars are doubtleſs of the ſame matter with the ſun, for they ſhine with their own light like him; and therefore we have the greateſt reaſon to think that they are all, like our ſun, centres to as many ſyſtems of innumerable worlds. For it can hardly be ſuppoſed that the all-wiſe and omnipotent Being ſhould create ſo many radiant bodies for no other uſe than to illuminate an infinite void. But by ſuppoſing them ſuns, and the centres of innumerable worlds, how juſtly do we open to ourſelves a vaſt field of probation, and an endleſs ſcene of hope to ground our expectation of an ever-future happineſs upon, ſuitable to the native dignity of that awful mind, which made and comprehends it, and whoſe works are all the buſineſs of eternity?

STAR, in fortification, a little fort, with five or more points, or ſaliant and re-entering angles, flanking one another, and their faces 90 or 100 feet long.

STAR, in pyrotechny, a compoſition of combuſtible matters, which being thrown aloft in the air, exhibits the appearance of a real ſtar.

STAR, in heraldry, denotes a charge frequently borne on the ſhield, and the honourable ordinaries, in the figure of a ſtar. It differs from the mullet or ſpring rowel, in that it is not pierced as this laſt is.

STAR, is alſo a badge of the honourable orders of the Garter and Bath.

STAR-BOARD, in the ſea-language, denotes the right-hand ſide of a ſhip: thus they ſay, ſtar-board the helm, or helm a ſtar-board, when he that conds would have the men at the helm, or ſteering-wheel, put the helm to the right ſide of the ſhip.

STAR-SHOT, a gelatinous ſubſtance frequently found in fields, and ſuppoſed by the vulgar, to have been produced by the meteor, called a falling-ſtar: but in reality, is the half digeſted food of herons, ſea-mews, and the like birds: for theſe birds, when ſhot, have been found, when dying, to diſgorge a ſubſtance of the ſame kind.

STARCH, a fecula or ſediment, found at the bottom of veſſels wherein wheat has been ſteeped in water; of which fecula, after the bran is ſeparated from it, by paſſing through ſieves, they form a kind of loaves, which being dried in the ſun, or an oven, is afterwards broke in little pieces, and ſo ſold.

The beſt is white, ſoft, and friable, eaſily broke into powder. Such as require very fine ſtarch, do not content themſelves, like the ſtarchmen, with refuſe wheat, but uſe the fineſt grain. The proceſs of making ſtarch of wheat is as follows: The grain, being well cleaned, is put to ferment in veſſels full of water, which they expoſe to the ſun when in its greateſt heat, changing the water twice a day, for the ſpace of eight or 12 days, according to the ſeaſon. When the grain burſts eaſily under the finger, they judge it ſufficiently fermented. The fermentation perfected, and the grain thus ſoftened it is put handful by handful into a canvas bag, to ſeparate the flour from the huſks, which is done by rubbing and beating it on a plank, laid acroſs the mouth of the empty veſſel that is to receive the flour.

As the veſſels are filled with this liquid flour, there is ſeen ſwimming at the top a rediſh water, which is to be carefully ſcummed off from time to time, and clean water put in its place; which, after ſtirring the whole together, is all to be ſtrained through a cloth or ſieve and what is left behind put into the veſſel with new water, and expoſed to the ſun for ſome time: and, as the ſediment thickens at the bottom, they drain off the water four or five times, by inclining the veſſel, but without paſſing it through the ſieve; what remains at bottom, is the ſtarch, which they cut in pieces to get out, and leave it to dry in the ſun; when dry, it is laid up for uſe.

STATE, the policy or form of government of a nation. Hence miniſters of ſtate, reaſons of ſtate, &c.

STATED *Winds*. See WIND.

STATER, an ancient kind of weight, weighing four Attick drachms; it was either of ſilver or gold; the former worth about two ſhillings and four-pence ſterling.

STATERA *Romana*, or ſtilyard, a name given to the Roman balance. See BALANCE.

STATES, a term applied to the ſeveral orders or claſſes of a people aſſembled to conſult of matters for the publick good.

STATES *General*, the name of an aſſembly conſiſting of the deputies of the ſeveral united provinces.

STATES *of Holland*, an aſſembly conſiſting of the deputies or the council, or colleges of each city, wherein reſides the ſovereignty of that province.

STATICKS, *Statice*, a branch of mathematicks, which conſiders the motion of bodies reſulting from weight or gravity. Thoſe who define mechanicks the ſcience of motion, make ſtaticks a member thereof, viz. that part which conſiders the motion of bodies ariſing from gravity. Others make them two diſtinct doctrines, reſtraining mechanicks to the doctrine of motion and weight in reference to the ſtructure and power of machines; and ſtaticks to the doctrine of motion conſidered merely as ariſing from the weight of bodies without any intermediate reſpect to machines. On which footing ſtaticks ſhould be the doctrine or theory of motion, and mechanicks the application thereof to machines.

STATICKS, *Statici*, in medicine, a kind of epilepticks, or perſons ſeized with epilepſies. Staticks differ from catelepticks, in that theſe laſt have no ſenſe of external objects, nor remember any thing that paſſes at the time of the paroxyſm: whereas the ſtatici are all the while taken up with ſome very ſtrong lively idea, which they remember well enough, out of the fit.

STATION, in geometry, &c. a place pitched upon to make an obſervation, take an angle or the like.

STATION, in aſtronomy, the poſition or appearance of a planet in the ſame point of the zodiack for ſeveral days. As the earth, whence we view the motions of the planets, is out of the centre of their orbits, the planets appear to proceed irregularly; being ſometimes ſeen to go forwards, that is, from weſt to eaſt, which is called the direction; ſometimes to go backwards, or from eaſt to weſt, which is called the retrogradation. Now between theſe two ſtates there muſt be an intermediate one, wherein the planet neither appears to go backwards nor forwards, but to ſtand ſtill, and keep the ſame place in her orbit: which is called her ſtation.

STATIONARY, in aſtronomy, the ſtate of a planet when it ſeems to remain immoveable in the ſame point of the zodiack. The planets having ſometimes a progreſſive, and ſometimes a retrogade motion, there will be ſome point wherein they appear ſtationary. Now a planet will be ſeen ſtationary when the line that joins the earth's and planet's centre is conſtantly directed to the ſame point in the heavens; that is, when it keeps parallel to itſelf. For all right lines drawn from any part of the earth's orbit, parallel to one another, do all point to the ſame ſtar; the diſtance of theſe lines being inſenſible, in compariſon of that of the fixed ſtar.

Saturn is ſeen ſtationary at the diſtance of ſomewhat more than a quadrant from the ſun; Jupiter at the diſtance of 52°, and Mars at a much greater diſtance. Saturn is ſtationary eight days, Jupiter four, Mars two, Venus one and a half, and Mercury an half, though the ſeveral ſtations are not always equal.

STATIONARY FEVER, a peculiar kind of fever, adapted and owing to ſome general conſtitution of the

air and ſeaſons. Sydenham obſerves, that there are certain general conſtitutions of years, which owe their origin neither to heat, cold, dryneſs, nor moiſture, but rather depend upon a certain ſecret and inexplicable alteration in the bowels of the earth, whence the air becomes impregnated with ſuch kinds of effluvia, as ſubject the human body to peculiar diſtempers, ſo long as that kind of conſtitution prevails, which, after a certain courſe of years, declines, and gives way to another. Each of theſe general conſtitutions is attended with its own proper and peculiar kind of fever, which never appears in any other; and this is thence called a ſtationary fever.

STATUARY, *Statuaria*, a branch of ſculpture employed in the making of ſtatues.

STATUE, *Statua*, is defined to be a piece of ſculpture in full relievo, repreſenting a human figure.

Daviler more ſcientifically defines ſtatue a repreſentation, in high relievo and inſulate, of ſome perſon diſtinguiſhed by his birth, merit, or great actions, placed as an ornament in a fine building, or expoſed in a publick place to preſerve the memory of his worth. In ſtrictneſs, the term ſtatue is only applied to figures on foot, the word being formed from ſtatura, the ſize of the body. Statues are formed with the chiſſel, of ſeveral matters, as ſtone, marble, plaiſter, &c. They are alſo caſt of various kinds of metal, particularly gold, ſilver, braſs, and lead.

Statues are uſually diſtinguiſhed into four general kinds: the firſt are thoſe leſs than the life, of which kind we have ſeveral ſtatues of great men, of kings, and of gods themſelves; the ſecond are thoſe equal to the life, in which manner it was that the ancients, at the publick expence, uſed to make ſtatues of perſons eminent for virtue, learning, or the ſervices they had done: the third, thoſe that exceed the life, among which, thoſe which ſurpaſſed the life once and a half, were for kings and emperors; and thoſe double the life, for heroes: the fourth kind were thoſe that exceeded the life twice, thrice, and even more, and were called coloſſuſſes. Every ſtatue, reſembling the perſon it is intended to repreſent, is called ſtatua iconica. Statues acquire various other denominations. Thus,

1. Allegorical ſtatue, is that which, under a human figure, or other ſymbol, repreſents ſomething of another kind, as a part of the earth, a ſeaſon, age, element, temperament, hour, &c.

2. Curule ſtatues, are thoſe which are repreſented in chariots drawn by bigæ, or quadrigæ, that is, by two or four horſes; of which kind there were ſeveral in the circuſes, hippodromes, &c. or in cars, as we ſee ſome, with triumphal arches, or antique medals.

3. Equeſtrian ſtatue, that which repreſents ſome illuſtrious perſon on horſeback, as that famous one of Marcus Aurelius at Rome; that of king Charles the firſt at Charing-Croſs; king George the ſecond, in Leiceſter-ſquare, &c.

4. Greek ſtatue, denotes a figure that is naked and antique: it being in this manner the Greeks repreſented their deities, athletæ of the Olympick games, and heroes: the ſtatues of heroes were particularly called Achillean ſtatues, by reaſon of the great number of figures of that prince in moſt of the cities of Greece.

5. Hydraulick ſtatue, is any figure placed as an ornament of a fountain or grotto, or that does the office of a jet d'eau, a cock, ſpout, or the like, by any of its parts, or by any attribute it holds; the like is to be underſtood of any animal ſerving for the ſame uſe.

6. Pedeſtrian ſtatue, a ſtatue ſtanding on foot; as that of king Charles the ſecond, in the Royal Exchange; and of king James the ſecond, in the Privy-Gardens.

7. Roman ſtatue, is an appellation given to ſuch as are cloathed, and which receive various names from their various dreſſes: thoſe of emperors, with long gowns over their armour, were called ſtatuæ paludatæ: thoſe of captains and cavaliers, with coats of arms, thoracatæ: thoſe of ſoldiers, with cuiraſſes, loricatæ: thoſe of ſenators and augurs, trabeatæ: thoſe of magiſtrates, with long robes, togatæ: thoſe of the people, with a plain tunica, tunicatæ: and, laſtly, thoſe of women, with long trains, ſtolatæ.

The Romans had another diviſion of ſtatues into divine, which were thoſe conſecrated to the gods, as Jupiter, Mars, Apollo, &c. Heroes, which were thoſe of the demi-gods, as Hercules, &c. and Auguſti, which were thoſe of the emperors, as thoſe two of Cæſar and Auguſtus, under the portico of the capitol.

In repairing a ſtatue caſt in a mould, they touch it up with a chiſſel, graver, or other inſtrument, to finiſh the places which have not come well off: they alſo clear off the barb, and what is redundant in the joints and projectures.

STATURE, the ſize or height of a man.

STATUTE, *Statutum*, in its general ſenſe, ſignifies a law, ordinance, decree, &c.

STATUTE, is alſo uſed for a ſhort inſtrument in writing, termed ſtatute-merchant, or ſtatute-ſtaple, which are in the nature of bonds, and called by the name ſtatutes, on account of their being made purſuant to the forms preſcribed by certain ſtatutes, whereby it is directed, before what perſons, and how they are to be made.

STATUTE-*Seſſions*, is taken for a meeting of conſtables and houſekeepers in ſome hundreds, by cuſtom, for the debating of differences between maſters and ſervants, the rating of ſervants wages, and beſtowing perſons in ſervice, &c.

STAVERS, or STAGGERS, among farriers, a giddineſs in a horſe's head, which ends in madneſs. This diſeaſe is frequently occaſioned by turning out a horſe to graſs too ſoon, before well cold, where, by hanging down his head to feed, bad vapours and humours are generated, which oppreſſing the brain, are the proximate cauſe of this diſeaſe. Sometimes it comes by over exerciſe in hot weather, which inflames the blood, &c. and ſometimes by noiſome ſmells in the ſtable, exceſſive eating, &c. The ſigns of it are, dimneſs of ſight, reeling and ſtaggering, watery eyes, &c. At length, for perfect pain, he beats his head againſt the wall, thruſts it into the litter, riſes and lies down with fury, &c.

For the cure of this diſtemper there are various preſcriptions, one of which is, firſt to bleed the horſe, then to diſſolve the quantity of a hazle-nut of ſweet butter in a ſaucer full of wine; then taking ſome lint, or fine flax, dip it in the mixture and ſtop his ears with it, and ſtitch them for 12 hours: ſome boil an ounce and a half of bitter almonds, two drachms of ox gall, half a pennyworth of black hellebore made into powder, grains of caſtoreum, vinegar, and varniſh, of each five drachms; which they boil and ſtrain, and then put into his ears.

STAVESACRE, in botany, the Engliſh name for a ſpecies of delphinum. It grows in ſhady places in the ſouthern parts of Europe, and is cultivated in our gardens for the ſake of its flowers, which are like thoſe of the larkſpur.

STAY, in the ſea-language, a big ſtrong rope, faſtened to the top of one maſt, and to the foot of that next before it, towards the prow, ſerving to keep it firm, and prevent its falling aftwards or towards the poop. All maſts, top-maſts, and flag-ſtaves, have their ſtays, except the ſprit-ſail, top-maſts. That of the maſt is called the main-ſtay. The main-maſt, fore-maſt, and thoſe belonging to them, have alſo back ſtays to prevent their pitching forwards or over-board, as going on either ſide of her. To ſtay a ſhip, or to bring her on the ſtays, is to manage her tackle and ſails ſo that ſhe cannot make any way forwards; which is done in order to her tacking about.

STEADY, a word of command, at ſea, for the man at the helm to keep the ſhip ſteady in her courſe, and not to make angles (or yaws, as they call them) in and out.

STEATOMA, a kind of encyſted tumour, conſiſting of a matter like ſuet or lard, ſoft, without pain, and without diſcolouring the ſkin.

STEEL, a kind of iron refined and purified by the fire with other ingredients.

Steel, of all other metals, is that ſuſceptible of the greateſt degree of hardneſs when well tempered, whence its great uſe in the making of tools and inſtruments of all kinds. Mr. Cramer obſerves, that the difference between iron and ſteel is, that the latter being much harder, will not yield to the hammer, but is brittle inſtead of being ductile, and reſiſts the file. Malleable iron grows rigid by being ſimply extinguiſhed in cold water, but it yet retains a conſiderable degree of ductility in the cold, and may be extended in all dimenſions with the hammer. Steel, however, if heated again, and cooled by ſlow degrees, may be filed and extended more or leſs by the hammer. But there are many degrees in the hardening of

of ſteel; for if it has been extremely red hot, and then quenched in cold water, in motion, it becomes greatly harder than if it had been but moderately red hot, and had been quenched in warm water. Steel is alſo of a darker colour than iron, and the ſurface of it, when broken, appears to conſiſt of ſmaller granulated, or even ſtriated, particles than the iron it was made of. Mr. Cramer further obſerves, that the method of making ſteel out of iron is either by cementation or by fuſion. That by cementation may be performed in the following manner: chooſe ſome bars of pure iron, not too thick, and quite free from heterogeneous matter, the flexibleneſs of it, both when hot and cold, being a very good ſign thereof: prepare a cement of charcoal duſt, moderately pulverized, one part: or of charcoal duſt two parts; bones, horns, or hair of animals, burnt to a blackneſs, in a cloſe veſſel and in a gentle fire, and afterwards reduced to a powder, one part; wood aſhes, half a part: mix them together; prepare an earthen cylindrical veſſel, two or three inches higher than the bars are long; put into the bottom of this veſſel the cement, prepared as before directed, ſo that being gently preſſed down, it may cover the bottom of the veſſel an inch and half deep; place then the bars perpendicularly, ſo that they may be every where about an inch from the ſides of the veſſel and from each other; fill the interſtices with the ſame cement, and cover alſo the bars with it, ſo that the veſſel may be quite full; next cover it with a tile, and ſtop the joints with thin lute: put this veſſel into a furnace, and keep it moderately but equally red hot, for ſix or ten hours together; when this is over, take the red hot bars out and dip them in cold water; they will then be brittle, and turned to ſteel. See Cæmentation.

The method of making ſteel by fuſion is as follows: take of iron ore, or of unmalleable iron, of the firſt fuſion, divide it into ſmall parcels, and put them into a bed made of charcoal duſt, in a ſmith's forge: let the quantity of iron be but ſmall for the experiment; put to it, as a defenſitive menſtruum, ſome of the vitreſcent ſcoriæ of ſand, or ſtones of the ſame nature; then put upon them a quantity of charcoal; light this, and admit only a gentle blaſt of the bellows, that the ſcoræ and the metal may both melt regularly: when this has been ſome time kept in fuſion, take it out, and divide it into two parts, which make red hot, and hammer into long bars: finally, beat them red hot, and plunge them into cold water, and they will be found to be ſteel, ſo very hard as not to be fileable, and ſo brittle as to break aſunder when ſtruck with conſiderable force.

A bar of iron, when converted into ſteel, is not equally ſo converted in all its parts; the fire has always acted more ſtrongly upon its ſurface than on its central parts, and it is therefore more perfect ſteel there than in its inner parts; but a perfection in the operation is not neceſſary to the ſteel's being good and uſeful, for the whole bar is often very good ſteel, as are alſo many bars made at the ſame time, yet all, perhaps, differently affected.

If the compoſition which is to convert the iron into ſteel be too ſtrong, or if the fire be too violent, or the matter continued too long in it; in all theſe caſes the ſteel will be over made. The way to meliorate ſuch ſteel as this, muſt be to diveſt it of part of its ſalts and its ſulphur, but particularly the latter; and M. Reaumur found, that, burying the bars of ſuch ſteel in lime, or any other alkaline ſubſtance that would readily abſorb the ſulphurs, and placing it for a proper time in the fire, it would be in a manner decompoſed again, and come out a very good and perfect ſteel.

By this management ſteel may again be converted or reduced to its primitive iron, and a body of any middle degree between ſteel and iron may be produced by ſtopping the proceſs at different points of time, or continuing it till all the adventitious ſalts and ſulphurs are drawn off or abſorbed.

Annealing or nealing of ſteel, is by ſome uſed for the ſoftening it, in order to make it work the eaſier, which is uſually done by giving it a blood-red heat in the fire, and then taking it out and letting it cool of itſelf: ſome have pretended to ſecrets in annealing, by which they could bring down iron or ſteel to the temper of lead: this was done by often heating the metal in melted lead, and letting it cool again out of the lead. But this method is found by Moxon to have no other effect than what it had from the former. Steel may, indeed, be made a little ſofter than in the common way, by covering it with coarſe powder of cow-horn or hoofs; thus incloſing it in a loam, heating the whole in a wood-fire till it be red hot, and then leaving the fire to go out of itſelf, and the ſteel to cool.

STEELYARD, *Statera Romana.* See the article Balance.

STEEPLE, an appendage erected generally on the weſtern end of a church, to hold the bells. Steeples are denominated from their form, either ſpires or towers; the firſt are ſuch as aſcend continually diminiſhing either conically or pyramidally. The latter are mere parallelopipeds. See Spire and Tower.

STEERAGE, on board a ſhip, that part of the ſhip next below the quarter-deck, before the bulk-head of the great cabbin, where the ſteerſman ſtands in moſt ſhips of war.

STEERING, in navigation, the directing a veſſel from one place to another by means of the helm and rudder. He is held the beſt ſteerſman who cauſes the leaſt motion in putting the helm over to and again, and who beſt keeps the ſhip from making yaws, that is, from running in and out. There are three methods of ſteering. 1. By any mark on the land, ſo as to keep the ſhip even by it. 2. By the compaſs, which is by keeping the ſhip's head on ſuch a rhumb or point of the compaſs, as beſt leads to port. 3. To ſteer as one is bidden or conned, which, in a great ſhip, is the duty of him that is taking his turn at the helm.

STEEVE, on board a ſhip. The ſeamen ſay the bowſprit or the beak-head of a ſhip ſteeves, when it ſtands too upright, or not ſtraight enough forward.

STEGANOGRAPHY, the art of ſecret writing, or of writing in cyphers, known only to the perſons correſponding.

STELLARA, in botany, a genus of plants, whoſe flower conſiſts of a pentaphyllous cup, with five bipartite, plane, oblong, withering petals; the ſtamina conſiſts of 10 ſlender filaments, topped with roundiſh antheræ; the fruit is an ovate, cloſe, unilocular capſule, opening with ſix valves, and contains a number of compreſſed roundiſh ſeeds. This genus includes the alſine of Tournefort.

STELLATE Plants, among botaniſts, are thoſe whoſe leaves are placed in the form of a ſtar at certain joints or diſtances on the ſtalks, ſuch are madder, clivers, &c.

STEM, in botany, that part of a plant ariſing immediately from the root, and which ſuſtains the branches, leaves, flowers, and fruit. See Stalk.

Stem *of a Ship*, that main piece of timber which comes bending from the keel below, where it is ſcarfed, as they call it; that is, pieced in; and riſes compaſſing right before the forecaſtle. This ſtem it is, which guides the rake of the ſhip, and all the but-ends of the planks are fixed into it. Falſe ſtem, in a ſhip, is that fixed before the right one, where that is made too flat for the ſhip to keep the wind well.

STEMPLES, in mining, croſs bars of wood in the ſhaft which are ſunk to mines. In many places the way is to ſink a perpendicular hole or ſhaft, the ſides of which they ſtrengthen from top to bottom with wood-work, to prevent the earth from falling in; the tranſverſe pieces of wood uſed for this purpoſe, they call ſtemples, and by means of theſe the miners, in ſome places, deſcend without uſing any rope, catching hold of theſe with their hands and feet.

STENOGRAPHY, or ſhort-hand. See Short-Hand.

STENTOROPHONICK Tube, a ſpeaking-trumpet, thus called from Stentor, a perſon mentioned by Homer.

STEREOGRAPHICK Projection, is the projection of the circles of the ſphere on the plane of ſome one great circle, the eye being placed in the pole of that circle. The method and practice of this projection in all the principal places, viz. on the planes of the meridian, equinoctial, and horizon, have already been given under the articles Map and Projection.

STEREOGRAPHY, the art of drawing the forms and figures of the ſolids upon a plane.

STEREOMETRY, that part of geometry which teaches how to meaſure ſolid bodies, i. e. to find the ſolidity

folidity or folid content of bodies, as globes, cylinders, cubes, veffels, fhips, &c.

STEREOTOMY, the art or act of cutting folids, or making fections thereof, as walls or other members in the profiles of architecture.

STERILITY, the quality of a thing that is barren, in oppofition to fertility.

STERLING, a term frequent in Britifh commerce. A pound, fhilling, or penny, fterling, fignifies as much as a pound, fhilling, or penny, of lawful money of Great Britain, as fettled by authority.

STERN *of a Ship*, ufually denotes all the hindermoft part of her, but properly it is only the outmoft part abaft.

Stern-Fast, denotes fome faftenings of ropes, &c. behind the ftern of a fhip, to which a cable or hawfer may be brought or fixed, in order to hold her ftern to a wharf, &c.

Stern-Post, a great timber let into the keel at the ftern of a fhip, fomewhat floping, into which are faftened the after-planks; and on this poft, by its pintle and gudgeons, hangs the rudder.

STERNOHYOIDÆUS, in anatomy, a pair of mufcles arifing from the upper and internal part of the bone of the fternum.

STERNUM, in anatomy, the breaft-bone, being a cartilaginous fort of bone which compofes the fore-part of the breaft, and into which the ribs are fitted.

In adults this bone is often fingle, but fometimes it has two, fometimes three pieces concurring to form it. Its fubftance is fungous and fpungy; its upper part is called the manubrium or handle, and in this there is on each fide a cavity for the articulation of the clavicles. In the middle it is narrow, and broad at the lower part. To this alfo there adheres a cartilage, called from its figure cartilago enfiformis, or xiphoides. This is ufually fingle; fometimes it is bifurcated, and not unfrequently bony throughout; and on each fide of the fternum there are feven cavities for the articulation of the feven true ribs.

STERNUTATION. See Sneezing.

STERNUTATIVE, or Sternutatory, a medicine proper to produce fneezing.

Sternutatives are of two kinds, gentle and violent. Of the firft kind are betony, fage, marjorum, tobacco, and the whole fafhionable tribe of fnuffs. Of the latter kind are euphorbium, white hellebore, pellitory, &c. Sternutatives operate by their fharp pungent parts, vellicating the inner membrane of the nofe, which is exceeding fenfible, and occafioning the ferous matter contained in the glands of the nofe, and in feveral finufes fituated in the bafe of the cranium and the os frontis, to be expelled.

STEW, a fmall kind of fifh pond, the peculiar office of which is to maintain fifh, and keep them in readinefs for the daily ufe of a family, &c. The fifh bred in the large ponds, are drawn out and put in here. For two large ponds of three or four acres a piece, it is adviseable to have four ftews, each two rods wide, and three long. The ftews are ufually in gardens, or at leaft near the houfe, to be more handy, and the better looked to. The method of making them is to carry the bottom in a continued decline from one end, with a mouth to favour the drawing with a net. See Fish Ponds.

Stews, or Stues, were alfo places anciently permitted in England to women of profeffed incontinency, for the proffer of their bodies to all comers. Thefe were under particular rules and laws of difcipline, appointed by the lord of the manor.

STEWARD, an officer appointed in another's ftead or place, and always taken for a principal officer within his jurifdiction. Of thefe there are various kinds. The greateft officer under the crown is the lord high fteward of England, an office that was anciently the inheritance of the earls of Leicefter, till forfeited by Simon de Mountfort, to king Henry III. But the power of this office is fo very great, that it has not been judged fafe to truft it any longer in the hands of a fubject, excepting only *pro hac vice*, occafionally: as to officiate at a coronation, at the arraignment of a nobleman for high-treafon, or the like. During his office, the fteward bears a white ftaff in his hand; and the trial, &c. ended, he breaks the ftaff, and with it his commiffion expires. There is likewife a lord fteward of the king's houfhold, who is the chief officer of the court, has the care of the king's houfe, and authority over all the officers and fervants of the houfehold, except fuch as belong to the chapel, chamber, and ftable. See Houshold.

There is alfo a fteward of the Marfhalfea, who has judicial authority. And in moft corporations, and all houfes of quality in the kingdom, there is an officer of the name and authority of a fteward. The fteward of a fhip is he who receives all the victuals from the purfer, and is to fee it well ftowed in the hold; all things of that nature belonging to the fhip's ufe are in his cuftody; he looks after the bread, and diftributes out the feveral meffes of victuals in the fhip; he hath an apartment for himfelf in the hold, which is called the fteward's room.

STIGMATA, in natural hiftory, the apertures in different parts of the bodies of infects, communicating with the tracheæ, or air-veffels, and ferving for the office of refpiration.

Nature has given to thefe minute animals a much larger number of tracheæ and bronchia than to us; all the two-winged and four-winged flies, which have a fingle or undivided corcelet, to which their legs are all fixed, have alfo four ftigmata in that corcelet, two on each fide; they have them alfo on the rings of their body, but thofe on the corcelet are the moft confiderable. Of the four on the corcelet, the two anterior ones are ufually the largeft; thefe, as well as the pofterior ones, are oblong, and placed obliquely to the length of the body. The colour of the ftigmata frequently differs from that of the corcelet; fome are yellowifh, others of a coffee-colour, or fome degrees of a fallow-colour, in flies whofe corcelet is brown, black, or blue. Flies have, befide thefe, feveral ftigmata alfo in the rings of their bodies, perhaps in every one of them: thefe ftigmata are not like thofe of the corcelet, but are round, ufually a little eminent above the reft of the furface, and refembling a pin's head.

STIL de Grain, in the colour-trade, the name of a compofition ufed for painting in oil or water, and is made by a decoction of the lycium or avignon-berry in allum-water, which is mixed with writing into a pafte, and formed into twifted fticks. It ought to be chofen of a fine gold-yellow, very fine, tender, and friable, and free from dirt.

STILE, *Stilus*. See Style.

STILLATITIOUS Oils, fuch as are produced by diftillation, in oppofition to thofe got by infufion, expreffion, &c.

STILL Bottoms, in the diftillery, a name given by the traders to what remains in the ftill after the working the wafh into low wines.

Thefe bottoms are procured in the greateft quantity from the malt-wafh, and are of fo much value to the diftiller, in the fattening of hogs, &c. that he often finds them one of the moft valuable articles of the bufinefs. They might alfo, as Dr. Shaw obferves, be put to other ufes, fuch as the affording a large proportion of acid fpirit and oil, a fuel and a fixed falt, and with fome addrefs and good management, a vinegar and tarter. Another advantageous ufe, is the adding them to the next brewing of the malt for more fpirit: the increafe of the produce from this is more than is eafily conceived.

STIMULATING, *Stimulans*, a property in angular or fharp bodies, whereby they vellicate, and caufe vibrations and inflections of the fibres of the nerves, and a greater derivation of nervous fluid into the part affected. Stimulants produce pain, heat, and rednefs. They may be reduced to violent penetrating depilatories, gentle finapifms, veficatories, and caufticks.

STING, *Aculeus*, an apparatus in the body of certain infects in form of a little fpear; ferving them as a weapon of offence. The fting of a bee, or wafp, is a curious piece of mechanifm; it confifts of a hollow tube, at the root whereof is a bag full of a fharp penetrating juice, which, in ftinging, is injected into the wound through the tube.

Within the tube, Mr. Derham has obferved, there lie two fmall fharp-bearded fpears: in the fting of a wafp he told eight beards on the fide of each other, like the beards of fifh hooks. One of thefe fpears in the fting or fheath lies with its point a little before the other; to be ready, as fhould feem, to be firft darted into the flefh: which once fixed, by means of its foremoft beard, the other then ftrikes in too; and fo they alternately pierce deeper and deeper their beards, taking more and more hold

hold in the flesh: after which the sheath or sting follows, to convey the poison into the wound; which, that it may pierce the better, is drawn into a point with a small slit below that point for the two spears to come out at. By means of these beards it is, that the animal is forced to leave its sting behind it, when disturbed, before it can have time to withdraw their spears into their scabbard.

STIPULATION, in the civil law, the act of stipulating, that is, of treating and concluding terms and conditions to be inserted in a contract. Stipulations were anciently performed at Rome with abundance of ceremonies, the first whereof was, that one party should interrogate, and the other answer, to give his consent and oblige himself.

STOCK, the trunk or body of a fruit-tree, into which the graft or bud is inserted.

All stocks for fruit-trees should be raised from the kernels or stones of the fruit; for suckers (though some people use them) besides being hardly ever well rooted, are very apt to produce quantities of other suckers, which weaken the trees exceedingly, and become very troublesome in the borders and walks of a garden. The best way therefore is to sow a few stones and kernels annually, or at least every other year, for a constant supply. Both these sorts of seeds are best when their fruit has been suffered to hang upon the tree till it drops through ripeness, and is afterwards permitted to begin to rot: but they must be carefully taken out before that rottenness can effect them. They should then be well cleared from the pulp, and the largest, plumpest, and heaviest, should be selected, and carefully laid up in dry sand, in a place where neither vermin nor moisture can come to them; for the latter would spoil their growth by rendering them mouldy, and the former, particularly rats and mice, are so very fond of the kernels of apples and pears, that they will even scratch them up after they are sown, and then devour them. Traps should therefore be set in the seminary, to catch those mischievous animals.

Layers, slips, and cuttings, when they have taken good root, make far better stocks for grafting on than any suckers; but still they are much inferior to those which are raised from seeds.

The best stocks for each sort of fruit are the following.

For apples, which must always be grafted upon a free stock, that is to say, upon a stock of their own kind, for they will not take upon that of any other fruit, the sorts most generally used are, 1. The crab-stock, as it is commonly termed; 2. The Dutch creeper; 3. The Paradise-stock; and, 4. The codlin-stock.

Stock-Gilliflowers, among gardeners, the name of a well known flower, and of which there are many beautiful species, distinguished by the names of the ten-weeks stock, the queen-stock, and the Brumpton-stock.

Stock-Jobbing, the art or mystery of trafficking in the publick stocks or funds. If stock-jobbers make any contract for the sale of stock, when they are not actually possessed of, or intitled to the same, those contracts will be deemed void. Likewise the parties so agreeing to sell, are liable to a penalty of 500l. The time of tendering stock sold, is held to be the last hour of the day on which it was to be transferred, and then an actual transfer is not necessary, unless the person to whom it ought to be made be at the place and time ready to receive the same.

Stock-Fish, or *Stock-Fisch*, in commerce, a kind of dried salted fish, of a greyish ash colour, and the belly somewhat whiter, being only cod-fish cured in a particular manner, which makes it necessary to beat it with sticks before it is fit for dressing.

STOCKING, that part of the cloathing of the leg and foot which immediately covers their nudity, and screens them from the cold, &c. Anciently, the only stockings in use were made of cloth, or of milled stuffs sewed together; but since the invention of kniting and weaving stockings of silk, wool, cotton, thread, &c. the use of cloth stockings is quite out of doors. The modern stockings, whether woven or knit, are a kind of plexuses, formed of an infinite number of little knots called stitches, loops, or meshes, intermingled in one another. Knit stockings are wrought with needles made of polished iron or brass wire, which interweave the threads, and form the meshes the stockings consist of. This operation is called knitting, the invention whereof is commonly attributed to the Scots, because the first works of this kind came from thence. It is added, that it was on this account that the company of stocking-knitters established at Paris in 1527, took for their patron St. Fiacre, who is said to be the son of a king of Scotland. Woven stockings are ordinarily very fine; they are manufactured on a frame, or machine of polished iron, the structure and apparatus whereof is exceedingly ingenious.

The English and French have greatly contested the honour of the invention of the stocking-loom; but we are assured, whatever pretensions the French claim to this invention, that the same was certainly devised by William Lee, of St. John's college, Cambridge, in the year 1589, though it is true, that he first made it publick in France, after despairing of success in his own country.

STOCKS, among ship-carpenters, a frame of timber, and great posts made ashore, to build pinnaces, ketches, boats, and such small craft, and sometimes small frigates. Hence we say, a ship is on the stocks, when she is building.

STOECHAS, in botany, Tournefort's name for a kind of lavender, now comprehended by Linnæus among the lavenders. See Lavandula.

STOICKS, a sect of ancient philosophers, the followers of Zeno, thus called from the Greek στοα, which signifies a porch or portico, in regard Zeno used to teach under a portico or piazza. It was the common fault of the Stoicks to introduce abundance of subtilty and dryness into their disputations, either by word of mouth, or in writing. They seemed as carefully to avoid all beauty of stile, as depravity of morals. Chrysippus, who was one of the Stoicks, did no great honour to his sect, and could only disgrace it. He believed the gods perishable, and maintained, that they would actually perish in the general conflagration. He allowed the most notorious and most abominable incests, and admitted the community of wives among sages.

To the praise of the Stoicks, in general, it must, however, be confessed, that, less intent than other philosophers upon frivolous, and often dangerous speculations, they devoted their studies to the clearing up of those great principles of morality which are the firmest supports of society; but the dryness and stiffness that prevailed in their writings, as well as in their manners, disgusted most of their readers, and abundantly lessened their utility. Reno's chief followers, among the Greeks, were Lucippus, Cleanthus, Chrysippus, Diogenes Babylonius, Antipater, Panætius, Possidonius, and Epictetus. Among the Romans, Cato, Varro, Cicero, Seneca, the emperor Antoninus, &c. The Stoicks cultivated logick, physicks, metaphysicks, &c. but especially ethicks. The principal of their dogmata of the former kinds, are, that there are certain catalepsias, or comprehensions, called also κοινας εννοιας, innate ideas, or principles naturally found in the mind: that God is the seminal cause of the universe; and, with the Platonists, that the world is an animal, by reason of God's inhabiting and informing every part thereof: that nature is an artificial fire, tending to generation: and that the world is at last to be destroyed by a conflagration. As for the morality of the Stoicks, it was couched much in paradoxes; as, that a wise man is void of all passions, or perturbation of mind; that pain is no real evil, but that a wise man is always happy in the midst of torture, is always the same, and is always joyful; that there is none else free; that none else ought to be esteemed king, magistrate, poet, or philosopher; that all wise men are great men; that they are the only friends or lovers; that nothing can happen to them beyond their expectations; that all virtues are insensibly connected together; that all good things are equal, and equally to be desired; that goodness admits of no increase or diminution. They own but one God, whom they, however, call by various names, as Fate, Jupiter, &c. by which they did not mean various things, but various powers and relations of the same thing. Providence they expressed under the name Fate, which Chrysippus defines to be a natural series, or composition of things mutually following each other, by an immutable nexus, or tie, fixed from all eternity. They held the immortality of the soul.

STOLE, *Stola*, a sacerdotal ornament worn by the Romish

Romiſh pariſh-prieſts, over their ſurplice, as a mark of ſuperiority in their reſpective churches.

Groom of the Stole, the eldeſt gentleman of his majeſty's bed-chamber, whoſe office and honour it is to preſent and put on his majeſty's firſt garment, or ſhirt, every morning, and to order the things in the chamber. See *Lord of the* Bed-Chamber.

STOMACH, *Ventriculus*, in anatomy, a hollow membraneous, organical part of an animal, deſtined to receive the food, after deglutition, and convert it into chyle. It lies immediately under the midriff, the liver covers a part of its right ſide, the ſpleen touches it on the left, and the colon at its bottom, to which alſo the cawl is tied. Its figure reſembles a bag-pipe, being long, large, wide, and pretty round at the bottom, but ſhorter and leſs convex on its upper part, where it has two orifices, one at each end, which are ſomewhat higher than the middle between them. The left orifice is called καρδια, to which the œſophagus is joined. By this orifice the aliments enter the ſtomach, where being digeſted, they aſcend obliquely to the pylorus, or right orifice, which is united to the firſt of the inteſtines. At this orifice the tunicles of the ſtomach are much thicker than they are any where elſe, and the inmoſt has a thick and ſtrong duplicature, in form of a ring, which ſerves as a valve to the pylorus, when it contracts and ſhuts. The ſtomach is compoſed of four membranes or coats. The firſt and inmoſt is made of ſhort fibres, which ſtand perpendicularly upon the fibres of the next coat: they are to be ſeen plainly towards the pylorus. When the ſtomach is diſtended with meat, theſe fibres become thick and ſhort. Whilſt they endeavour to reſtore themſelves by their natural elaſticity, they contract the cavity of the ſtomach for the attrition and expulſion of the aliments. This coat is much larger than the reſt, being full of plates and wrinkles, and chiefly about the pylorus: theſe plaits retard the chyle, that it run not out of the ſtomach before it be ſufficiently digeſted. In this coat there are, alſo, a great number of ſmall glands, which ſeparate a liquor that beſmears all the cavities of the ſtomach, and helps the concoction of the aliments; therefore, this coat is called tunica glanduloſa. The ſecond is much finer and thinner; it is altogether nervous; it is of an exquiſite ſenſe, and is called nervoſa. The third is muſcular, being made of ſtraight and circular figures; the ſtraight run upon the upper part of the ſtomach, between its ſuperior and inferior orifices; and the circular run obliquely from the upper part of the ſtomach to the bottom. Of theſe, the innermoſt deſcend towards the right ſide, and the outermoſt towards the left; ſo that by their action both ends of the ſtomach are drawn towards its middle, and the whole is equally contracted; by their contraction and continual motion, the attrition and digeſtion of the aliments is in a great meaſure performed. The fourth tunicle is common, it comes from the peritonæum. The ſtomach ſends veins to the porta, viz. the gaſtrica, pylorica; and vas breve, and branches to the gaſtro-epiplois dextra and ſiniſtra, which are accompanied with branches of the arteria cæliaca, all which lie immediately under the fourth coat of the ſtomach. The eight pair of nerves, or par vagum, give two conſiderable branches to the ſtomach, which, deſcending by the ſides of the gullet, divide each into two branches, the external and internal. The two external branches unite in one, and the internal do ſo likewiſe; both which piercing the midriff, form, by a great number of ſmall twigs, upon the upper orifice of the ſtomach and plexus, and then the internal branch ſpreads itſelf down to the bottom of the ſtomach; and the external branch ſpreads itſelf upon the inſide about the upper orifice of the ſtomach.

STOMACHICK, in pharmacy, medicines that ſtrengthen the ſtomach, and promote digeſtion, &c. See Digestion. Stomachick corroborants are ſuch as ſtrengthen the tone of the ſtomachick and inteſtines, among which are carminatives, as the roots of galangals, red gentian, zedoary, pimpinella, calamus, aromaticus, and arum. Of barks and rinds, thoſe of canella alba, ſaſſafras, citron, Seville and China oranges, &c. Of ſpices, pepper, ginger, cloves, cinnamon, cardamums, and mace.

Other things of this nature are, among ſimples, Roman and common chamæmile, wormwood, with the ſpirit of ſalt and ſweet nitre.

Among compounds, are the ſal volatile ſylvii, the ſtomachick elixir, the eſſence of orange-peel with ſweet ſpirit of nitre, tincture of tartar, oils of oranges prepared by expreſſion, the compound eſſence of wormwood, &c.

Stomachick, is alſo applied to the arteries, veins, &c. of the ſtomach.

STOMATICA, a term uſed by ſome for all medicines uſed in diſorders of the mouth and fauces.

STONES, in natural hiſtory, are defined to be eſſentially compound foſſils, not inflammable, nor ſoluble in water or oil, not at all ductile; found in continued ſtrata, or beds, of great extent; formed either of a congeries of ſmall particles, in ſome degree reſembling ſand, and lodged in a ſmoother cementitious matter, and the grit or ſand-like particles, running together into one ſmooth maſs; or, finally, of granules cohering by contact, without any cementitious matter among them; or compoſed of chryſtal or ſpar, uſually debaſed by earth, and often mixed with talck, and other extraneous particles.

Of this claſs of foſſils there are three orders; and under theſe, eight genera.

The firſt order comprehends all the coarſe, harſh, and rough ſtones, of a lax texture, and compoſed of a viſible grit, reſembling ſand in form, and uſually immerſed in a cementitious matter, and of little natural brightneſs; ſcarce capable of any poliſh, and naturally mouldering away in form of powder from the tools of the workmen. The genera of this order are two, viz. the ammochiſta and pſaduria; the former of which conſtitute our grey and rough ſlates, and the latter comprehends moſt of the ſtones uſed in building, particularly Portland ſtone.

The ſecond order conſiſts of ſtones moderately fine, of a more compact and even texture, ſcarce diſtinguiſhable conſtruction, and affording no ſand-like particles to the view; of ſome natural brightneſs, capable of a tolerable poliſh, and flying off from the tools of the workmen in form of ſmall chips.

The third order conſiſts of ſtones of a very fine ſubſtance and elegant ſtructure, naturally of a great brightneſs, and capable of an elegant poliſh: compoſed of granules of various ſhapes and ſizes, but uſually flattiſh, ſometimes more, ſometimes leſs diſtinct; and, in ſome ſpecies, running together into uniform maſſes, but never lodged in any cementitious ſubſtance. Of this order are the marbles, alabaſters, porphyries, and granites.

Stone, *Lithiaſis*, and *Calculus Humanus*, in medicine, a ſtony or terreſtrial concretion in any of the urinary paſſages, which occaſions a difficulty in making water, and a pain in the ſmall of the back, or about the os pubis.

When this collection is ſo large as to form one or more bodies, unable by reaſon of their ſize to paſs through the conduits of urine, they frequently cauſe great pain, ulcers in the parts, and an entire ſuppreſſion of urine; and, from the part where this obſtructing matter happens to lodge, this diſtemper receives its denomination, as from the kidnies, bladders, ureters, or urethra.

This diſorder, ſays Dr. Shaw, may ſometimes have an hereditary cauſe; that is, the urinary paſſages may be naturally ſtraighter than they ought to be; or the conſtitution may be naturally diſpoſed to generate a ſtony matter; an obſtructed perſpiration, and a cold or moiſt air, may alſo give riſe to it; for by means hereof the more heavy particles of the animal fluids will be detained in the body.

Another occaſion of this diſtemper may be the uſe of ſuch waters, as by running through various ſtrata of the earth, are impregnated with ſtony particles. There are ſome wines too, and other liquors, which being either foul or not ſufficiently fined down, or abounding in tartar, or other terreſtrial corpuſcles, may lay the foundation for the ſtone. Again, in perſons ſubject to the aſthma or gout, who have a weak digeſtion, viſcid chyle, and ſtony concretions in the joints, there are manifeſt ſeeds of this diſtemper. In ſhort, whatever can bring on an accumulation of earthy particles in the urinary paſſages, whether by obſtructing or leſſening the capacity of the canals, or by immediately or remotely producing the ſubſtance itſelf, will cauſe gravel, and in time the ſtone.

The ſymptoms of the gravel or ſtone are, frequently, a nauſea and vomiting, with a numbneſs down the leg and thigh of the party affected; a pain fixed or moveable, great or leſs, in proportion to the bulk of impacted matter felt generally about the region of the loins, os pubis, and

and parts adjacent. This pain is very acute, and almoſt continual, when the gravel or ſtone remains at the head of the ureters; but begins to leſſen, as it is protruded forwards. Sometimes, when the ſtone is angular, or continues long fixed, the urine is bloody; and, generally, nephretick obſtructions, it is thin, and made in a ſmall quantity, eſpecially at the beginning of the fit. Sometimes there happens a total ſuppreſſion of it, in which caſe both the ureters may be obſtructed.

When the obſtructed matter is forced into the bladder, the urine is turbid, and comes away plentifully; and there appears in it much ſand, and ſometimes ſmall ſtones; which when angular, are ſeldom voided without much pain; and when the paroxyſm is violent, and of long continuance, there ſometimes happens an entire ſuppreſſion of ſtool, ſo far, that catharticks loſe their force; and ſometimes too, though rarely, the terreſtrial matter is depoſited in ſuch parts where the canals are lax, and the circulation languid, ſo as at the ſame time to occaſion both an arthritick and nephritick fit. When a ſtone is lodged in the urethra, the pain generally proves exquiſite, but limited to the part, where ſometimes the ſtone will bulge outwards, and may be felt with the fingers.

All paroxyſms, in caſe of a confirmed ſtone, are dangerous. An accumulation of ſand in the kidneys or ureters, is leſs dangerous than a formed ſtone.

A ſtone in the kidneys is of worſe conſequence than in the ureters, and more or leſs ſo in proportion to its bigneſs. The largeſt ſtone, naturally capable of paſſing the urethra in men, is ſuppoſed to be about the ſize of a ſmall hazle-nut; but in women, one conſiderably larger may paſs the meatus urinarius. When both kidnies, or both ureters, are affected, it is ſo much the more dangerous, eſpecially if attended with ſharp pain, exulceration, inflammation, want of ſleep, loſs of ſtrength, a fever, ſuppreſſion of urine, &c. When the ſymptoms continue many days without intermiſſion, the caſe is deſperate; eſpecially if coldneſs has ſeized the extremities, the pulſe ticks, and the patient has cold ſweats, &c. When the caſe is habitual or hereditary, or happens in old age, or gouty conſtitutions, it is difficult.

The ſymptoms of bloody urine, continuing after the fit is gone off, prove hard to remove. When the urine is plentifully diſcharged, has its ordinary ſediment, is turbid, and the ſymptoms decreaſe, it is a ſign the paroxyſm is going off. If a large ſtone be long detained in the urethra, eſpecially if it be rugged, and can neither be propelled backwards or forwards, and there be a total ſuppreſſion of urine, the caſe uſually proves mortal.

As to the method of cure, it conſiſts in the eaſy excluſion of the ſtone, and the preventing of breeding of others. To this purpoſe, Sydenham recommends bleeding, a poſſet-drink, in which two ounces of marſh-mallow roots have been boiled, and an emollient clyſter; after which, he adviſes a pretty large doſe of an opiate: that is, about 25 drops of the Thebaick tincture, or 15 grains of the ſaponaceous pills. And Huxham tells us, that nothing is ſo efficacious to eaſe the pain, and promote the deſcent of the ſtone through the ureters, as a tepid and emollient bath. See Lithontripticks.

Stone, alſo denotes a certain quantity or weight of ſome commodities. See Weight. A ſtone of beef, at London, is the quantity of eight pounds; in Herefordſhire, 12 pounds; in the north 16 pounds. A ſtone of wool (according to the ſtatute of the 11th of Hen. VII.) is to weigh 14 pounds; yet in ſome places it is more, in others leſs; as in Glouceſterſhire, 15 pounds; in Herefordſhire, 12 pounds. A ſtone, among horſe-courſers, is the weight of 14 pounds.

Stone-Crop, in botany. See Sedum.

STONEHENGE, in antiquity, a famed pile or monument of huge ſtones on Saliſbury-plain, ſix miles diſtant from that city. It conſiſts of the remains of four ranks of rough ſtones, ranged one within another, ſome of them, eſpecially in the outermoſt and third rank, ſome of them 24 feet high, and ſome of them ſeven broad; ſuſtaining others laid acroſs their heads and faſtened by mortiſes: ſo that the whole muſt have anciently hung together.

Antiquaries are divided, as to the origin, uſe, ſtructure, &c. of this wonderful fabrick. Moſt of them take the ſtones to be artificial, and to have been made on the ſpot; which ſeems the more probable, as we are pretty well aſſured the ancients had the art of making ſtones with ſand and a ſtrong lime or cement; and as the ſtones ſeem too big for land carriage; and yet are in a place, which for ſome miles round, ſcarce affords any ſtones at all. The legends give various other accounts; ſuch as, that they were brought miraculouſly by St. Patrick, from Ireland, &c.

As to its uſe, ſome antiquaries take it to have been an ancient temple of the Druids; others, of the Romans, dedicated to Cœlus; in which they are confirmed by its having been open a top. Others, reading the name, *Stone-hengiſt*, maintain it to have been a monument erected in memory of Hengiſt, the firſt general of the Saxons in England: and others, to name no more, will have it a funeral monument, raiſed to that brave Romano-Briton, Aurelius Ambroſius; to which opinion, ſome circumſtances of his actions, the ſtill remaining Latin name of the place (Mons Ambroſii) and that very ancient Welſh proverb, *Mal gwaith Emrys*, like the work of Ambroſe, give ſome countenance.

STONY Lands, in agriculture, ſuch as are fond of flints, pebbles, or ſmall fragments of free-ſtone. Theſe lands, in many places, yield good crops; and the general rule is, that, in cold and ſtiff lands, the ſtones ſhould be carefully removed; but, in light and dry lands, it will be advantageous to leave them. However, they always fallow theſe lands every other year, unleſs they ſow them with lentils; and when they are quite worn out, they lay them down for clover or rye-graſs.

STOOMING *of Wine*, is the putting bags of herbs, or other ingredients, into it.

STOP, in the menage, is a pauſe, or diſcontinuance of a horſe's motion.

Stops, or points, in grammar. See Point and Punctuation.

STOPPER, in a ſhip, a piece of cable-laid rope, having a wale-knot at one end, with a laniard faſtened to it; and the other end is ſpliced round a thimble in the ring-bolts upon deck, and at the bits: its uſe is to ſtop the cable, that it may not run out too faſt; in order to which, they make turns with the laniard about the cable, and the wale-knot ſtops it, ſo that it cannot ſlip away faſter than is neceſſary.

STORAX, or Styrax, in natural hiſtory and pharmacy, a dry and ſolid reſin, of a rediſh colour, and a peculiarly fragrant ſmell, of which there are two kinds, the ſtyrax calamita, or ſtyrax in tears, and the ſtyrax vulgaris, whereof the former is by far the purer and finer kind, imported in ſmall looſe granules, or elſe in large maſſes compoſed of ſuch granules: it anciently uſed to be packed up in reeds, for the more ſecure carriage; whence the name. The common ſtorax is likewiſe a fine and pure reſin, though leſs ſo than the former; and is brought to us in large lumps, not formed of granules, but of one uniform conſiſtence.

Theſe are the two genuine kinds of ſtorax; but neither of them is that met with in our ſhops, which is a kind of ſaw-duſt connected into lumps, by juſt ſo much of the ſtorax-reſin as will make the other matters hang together. This is what our apothecaries uſe, under the name of ſtorax; but it is adviſeable, to ſtrain carefully the pure reſin from the filth, and uſe no part of the latter.

The two genuine kinds of ſtorax, which ought always to be uſed where they can be had, differ only in this; that the granulated ſtorax flows naturally from the ſtyrax tree, and the common kind is obtained from the ſame tree, by inciſion.

Storax is brought to us from Syria, and the E. Indies; and ought to be choſen pure, very fragrant, and of an acrid taſte. It is much recommended as a detergent and balſamick, in diſorders of the breaſt: it is alſo eſteemed a cordial, and is recommended in vertigoes, and other diſorders of the head and nerves.

Liquid Storax, in pharmacy, is a drug very different from the reſin above deſcribed; being a reſinous juice, of the conſiſtence of Venice-turpentine, or thicker: it is, when clean, pellucid, of a browniſh colour, with a caſt ſometimes of rediſh, and ſometimes of greyiſh in it. Its ſmell is ſomewhat like that of common ſtorax, only much ſtronger, and even diſagreeable: its taſte is acrid, aromatick, and ſomewhat bitteriſh; and it is oily, or unctuous.

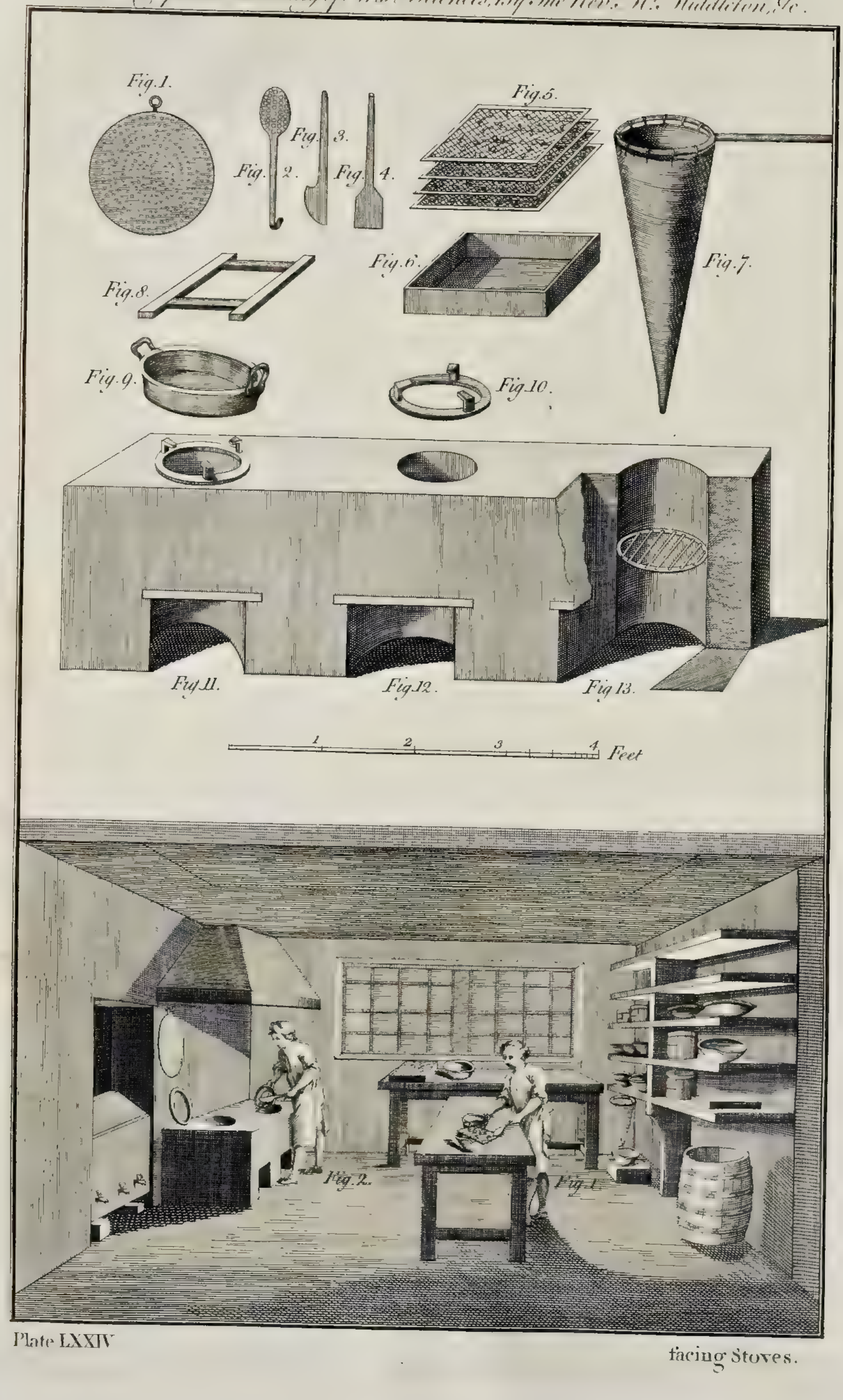

Plate LXXIV

facing Stoves.

unctuous. It ſhould be choſen thin, pellucid, of a clean brown colour, and of a very ſtrong ſmell.

There is another coarſer and very impure kind, not at all pellucid, and of a grey or browniſh colour: its ſmell is much more languid, and alſo more diſagreeable than that of the pure kind; whereof it ſeems to be only the dregs, though it is by much the moſt common liquid ſtorax in the ſhops.

Petiver gives the moſt rational account of the origin of liquid ſtorax; which, he ſays, is prepared from the bark of a tree, called by the Turks roſa mallos, which is frequent in the iſland Cobras. The bark of this tree being bruiſed and macerated in ſea water, is boiled to the conſiſtence of birdlime; they then collect the reſinous matter that ſwims on the top; which, being foul, is boiled again in ſea water, and ſtrained: what paſſes the water is the finer, and what remains in them the coarſer liquid ſtorax. He adds, that liquid ſtorax is much eſteemed in the eaſt, as a perfume. As to its medicinal virtues, they are nearly related to thoſe of turpentine: it is preſcribed, internally, as a detergent and diuretick; and externally, to prevent mortifications.

STOVES, in gardening, are buildings erected for the preſervation of tender exotick plants, which will not live in theſe northern countries, without artificial warmth in winter. Theſe are built in different methods, according to the ingenuity of the artiſt, or the different purpoſes for which they are intended; but in England they are at preſent reducible to two.

The firſt is called a dry ſtove, being ſo contrived, that the flues through which the ſmoke paſſes are either carried under the pavement of the floor, or elſe are erected in the back part of the houſe, over each other, and are returned ſix or eight times the whole length of the ſtove. In theſe ſtoves the plants are placed on ſhelves of boards laid on a ſcaffold above each other, for the greater advantage of their ſtanding in ſight, and enjoying an equal ſhare of light and air. In theſe ſtoves are commonly placed the tender ſorts of aloes, cereus's, euphorbiums, tithymals, and other ſucculent plants, which are impatient of moiſture in winter; and therefore require, for the moſt part, to be kept in a ſeparate ſtove, and not placed among trees, or herbaceous plants, which perſpire freely, and thereby often cauſe a damp air in the houſe, which is imbibed by the ſucculent plants, to their no ſmall prejudice.

Theſe ſtoves may be regulated by a thermometer, ſo as not to over-heat them, nor to let the plants ſuffer by cold; in order to which all ſuch plants, as require nearly the ſame degree of heat, ſhould be placed by themſelves in a ſeparate houſe; for, if in the ſame ſtove there are plants placed of many different countries, which require as many different heats, by making the houſe warm enough for ſome plants; others, by having too much heat, are drawn and ſpoiled.

The other ſorts of ſtoves are commonly called bark ſtoves, to diſtinguiſh them from the dry ſtoves already mentioned. Theſe have a large pit, nearly the length of the houſe, three feet deep, and ſix or ſeven feet wide, according to the breadth of the houſe; which pit is filled with freſh tanners bark, to make an hot bed; and in this bed the pots of the moiſt tender exotick trees, and herbaceous plants, are plunged: the heat of this bed being moderate, the roots of the plants are always kept in action; and the moiſture, detained by the bark, keeps the fibres of their roots in a ductile ſtate, which, in the dry ſtove, where they are placed on ſhelves, are ſubject to dry too faſt, to the great injury of the plants. In theſe ſtoves, if they are rightly contrived, may be preſerved the moſt tender exotick trees and plants, which, before the uſe of the bark was introduced, were thought impoſſible to be kept in England; but, as there is ſome ſkill required in the ſtructure of both theſe ſtoves, we ſhall deſcribe them as intelligibly as poſſible, particularly the bark ſtove; by which it is hoped every curious perſon will be capable of directing his workmen in their ſtructure.

The dimenſion of this ſtove ſhould be proportioned to the number of plants intended to be preſerved, or the particular fancy of the owner; but their length ſhould not exceed 40 feet, unleſs there be two fire-places; and, in that caſe, it will be proper to make a partition of glaſs in the middle, and to have two tan-pits, that there may be two different heats for plants from different countries, for the reaſons before given in the account of dry ſtoves; and to erect a range of ſtoves, they ſhould be all built in one, and only divided with glaſs partitions, at leaſt the half way towards the front; which will be of great advantage to the plants, becauſe they may have the air in each diviſion ſhifted by ſliding the glaſſes of the partitions, or by opening the glaſs-door, which ſhould be made between each diviſion, for the more eaſy paſſage from one to the other.

This ſtove ſhould be raiſed above the level of the ground, in proportion to the dryneſs of the place; for, if it be built on a moiſt ſituation, the whole ſhould be placed upon the top of the ground; ſo that the brick-work in the front muſt be raiſed three feet above the ſurface, which is the depth of the bark-bed, whereby none of the bark will be in danger of lying in water: but, if the ſoil be dry, the brick-work in front need not be more than one foot above-ground, and the pit may be ſunk two feet below the ſurface. Upon the top of this brick-work, in front, muſt be laid the plate of timber, into which the wood-work of the frame is to be mortiſed; and the upper timber in front muſt be placed four feet aſunder, or ſomewhat more, which is the proportion of the width of the glaſs doors or ſaſhes: theſe ſhould be about ſix feet and an half, or ſeven feet long, and placed upright; but from the top of theſe ſhould be ſloping glaſſes, which ſhould reach within three feet of the back of the ſtove, where there ſhould be a ſtrong crown piece of timber placed, in which there ſhould be a groove made for the glaſſes to ſlide into. The wall in the back part of the ſtove ſhould be at leaſt 13 inches thick: but 18 inches is ſtill better; becauſe the thicker the outſide wall is built, the more the heat of the flues will be kept in the houſe; and carried up, about nine feet above the ſurface of the bark-bed; and, from the top of this wall, there ſhould be a ſloping roof to the crown piece where the glaſſes ſlide in. This crown piece ſhould be about 16 feet high from the ſurface of the bark-bed or floor, which will give a ſufficient declivity to the ſloping glaſſes to carry off the wet, and be of a reaſonable height for containing many tall plants. The back-roof may be ſlated, covered with lead, or tiled, according to the fancy of the owner: for the manner of this outſide building is often very various, and differently built.

In the front of the houſe there ſhould be a walk, about 18 or 20 inches wide, for the conveniency of walking; next to which the bark-pit muſt be placed, which ſhould be in width proportionable to the breadth of the houſe: if the houſe is 12 feet wide, which is a due proportion, the pit may be ſeven feet wide; and behind the pit ſhould be a walk 18 inches wide, to paſs in order to water the plants, &c. then there will be 22 inches left next the back wall, to erect the flues, which muſt be all raiſed above the top of the bark-bed; theſe flues ought to be one foot wide in the clear, that they may not be too ſoon ſtopped with the ſoot; and the lower flue, into which the ſmoke firſt enters from the fire, ſhould be two feet deep in the clear; and this may be covered either with caſt iron plates, or broad tiles; over this the ſecond flue muſt be returned back again, which may be 18 inches deep, and covered on the top as before; and ſo, in like manner, the flues may be returned over each other three or four times, that the heat may be ſpent before the ſmoke paſſes off. The thickneſs of the wall in front of theſe flues need not be more than four inches; but it muſt be well jointed with mortar, and plaiſtered within-ſide to prevent the ſmoke from getting into the houſe; and the outſide ſhould be faced with mortar, and covered with a coarſe cloth, to keep the mortar from cracking, as is practiſed in ſetting up coppers. If this be carefully done, there will be no danger of the ſmoke entering the houſe, which cannot be too carefully avoided; for there is nothing more injurious to plants than ſmoke, which will cauſe them to drop their leaves; and, if it continue long in the houſe, will entirely deſtroy them.

The fire-place may be made either at one end, or in the middle, according as there is moſt conveniency; for, wherever it is placed, it ſhould have a ſhed over it, and not be expoſed to the open air; for it will be impoſſible to make the fire burn equally, where the wind has full ingreſs to it; and it will be troubleſome to attend the fire in wet weather, where it is expoſed to the rain.

The contrivance of the furnace muſt be according to the

the fuel which is designed to burn; but, as turf is the best firing for stoves, where it can be had, because it burns more moderately, and lasts longer, than any other sort of fuel, and so requires less attendance, we shall describe a proper sort of furnace for that purpose.

The whole of this furnace should be erected within the house, which will be a great addition to the heat; and the front wall on the out-side of the fire place, next the shed, should be three bricks thick, the better to prevent the heat from coming out that way. The door of the furnace, at which the fuel is put in, must be as small as conveniently may be to admit of the fuel; and this door should be placed near the upper part of the furnace, and made to shut as close as possible; so that there may but little of the heat pass off through it. This furnace should be about 22 inches deep, and 16 inches square at bottom; but may be sloped off on every side, so as to be two feet square at the top; and under this furnace should be a place for the ashes to fall into, which should be about a foot deep, and as wide as the bottom of the furnace: this should also have an iron door to shut as close as possible; but just over the ash-hole, above the bars which support the fuel, should be a square hole about four inches wide, to let in air to make the fire burn: this must also have an iron frame, and a door to shut close when the fire is perfectly lighted, which will make the fuel last the longer, and the heat will be more moderate.

The top of this furnace should be nearly equal to the top of the bark-bed, that the lowest flue may be above the fire; so that there may be a greater draught for the smoke. and the furnace should be covered with a large iron plate, closely cemented to the brick-work, to prevent the smoke from getting out; or it may be arched over with bricks, but you should be very careful, wherever the fire is placed, that it be not too near the bark-bed; for the heat of the fire will, by its long continuance, dry the bark, so that it will lose its virtue, and be in danger of taking fire; to prevent which, it will be the best method to continue an hollow between the brick-work of the fire and that of the pit, about eight inches wide; which will effectually prevent any damage arising from the heat of the fire; and there should be no wood-work placed any where near the flues, or the fire-place, because the continual heat of the stove may in time dry it so much as to cause it to take fire, which ought to be very carefully guarded against.

The entrance into this stove should be either from a green-house, the dry stove, or else through the shed where the fire is made, because, in cold weather, the front-glasses must not be opened.

The other sort of stove, which is commonly called the dry stove, as was before said, may be either built with upright and sloping glasses at the top, in the same manner, and after the same model of the bark-stove; or else the front-glasses, which should run from the floor to the ceiling, may be laid sloping, to an angle of 45 degrees, the better to admit the rays of the sun in spring and autumn: the latter method has been chiefly followed by most persons who have built this sort of stoves: but the best contrivance of a stove of this kind, is to have it built after the model of the bark-stove, with upright glasses in front, and sloping glasses over them, because this will more easily admit the sun at all the different seasons; for, in summer, when the sun is high, the top glasses will admit the rays to shine almost all over the house: and in winter, when the sun is low, the front glasses will admit its rays; whereas, when the glasses are laid to any declivity in one direction, the rays of the sun will not fall directly thereon above a fortnight in autumn, and about the same time in spring; and, during the other parts of the year, they will fall obliquely thereon; and. in summer, when the sun is high, the rays will not reach above five or six feet from the glasses.

Besides, the plants placed towards the back part of the house will not thrive in the summer season for want of air; whereas, when there are sloping glasses at the top, which run within four feet of the back of the house; these, by being drawn down in hot weather, will let in perpendicular air to all the plants; and, of how much service this is to all sorts of plants, every one who has had opportunity of observing the growth of plants in a stove, will easily judge; for, when plants are placed under cover of a ceiling, they always turn themselves towards the air and light, and thereby grow crooked; and if, in order to preserve them strait, they are turned every week, they will nevertheless grow weak, and look pale and sickly, like a person shut up in a dungeon; for which reasons, whoever has made trial of both sorts of stoves, will readily recommend the model of the bark-stove for every purpose.

Stove, in confectionary, a small furnace, over which they prepare many of their goods.

Explanation of Plate LXXIV.

Representing the inner part of a confectioner's laboratory, when the stoves are placed.

The lower Compartment.

Is a perspective view of the part of the inside of a confectioner's laboratory.

Fig. 1. A workman taking out with a spatula the candied fruits from the moulds.

Fig. 2. A workman at the stove, putting almonds on the stove, in order to render them crisp.

Upper Compartment.

Fig. 1. A copper utensil of a circular form, large and flat, and pierced with holes like a skimmer.

Fig. 2. A skimmer. This is also of copper.

Fig. 3. A spatula.

Fig. 4. A square spatula.

Fig. 5. Grates belonging to the candying moulds, they are of different sizes, and usually made of brass wire; but any other metal, lead excepted, is preferable. The fruit is laid first on the large ones to drain the sugar from it. The lesser ones fix over each other in their moulds, and the fruit being laid between two, they prevent its sticking together in the candying.

Fig. 6. The candying moulds.

Fig. 7. A filtrating and clarifying.

Fig. 8. A frame, to each corner of which is fixed an iron hook: to these is tied a piece of fine canvass: then the frame is laid on a tub, and the liquor, intended to be clarified, poured through the canvass.

Fig. 9. A copper pan for different purposes.

Fig. 10. A trivet to support this pan over the fire, by which means it is kept a proper distance from it.

Fig. 11, 12, 13. Three furnaces: the first has the trivet on it: the second is without a trivet, and the third is placed with the fore part downwards, to shew the grate, and the ash-pan.

STOWAGE, in the sea language, is the putting of goods orderly in the hold, &c. of a ship, the most ponderous and heavy next the ballast.

STRABISMUS, a disorder of the eye, makes it look asquint, either upwards, downwards, or awry. The strabismus consists in a retraction of the ball of the eye, towards one side; occasioned by a convulsion or palsy of one of its muscles.

STRAIGHT, Streight, or Strait, in hydrography, a narrow sea, or gut shut up between lands on either side, and affording a passage out of one great sea into another.

STRAIN, or Sprain, a violent extension of the sinews or tendons of some muscle.

STRANDED, is when a ship by tempest or ill steerage is run on ground and receives great damage.

STRANGER, in law, denotes a person who is not privy or party to an act.

STRANGLES, a distemper to which colts and young horses are very subject; and begins with a swelling between the jaw-bones, which sometimes extends to the muscles of the tongue; and is attended with so great heat, pain, and inflammation, that sometimes till matter is formed, the horse swallows with the utmost difficulty.

The symptoms are extraordinary heat and feeverishness, with a painful cough, and a great inclination to drink without being able; some horses losing their appetite intirely, others eating but little, by reason of the pain which chewing and swallowing occasions: when the swelling begins on the inside of the jaw-bones, it is much longer in coming to matter than when more to the middle; when it arises among the glands, and divides into several tumours, the cure is generally tedious, as it breaks in different places; and when it forms upwards on the windpipe and gullet, there is sometimes danger of suffocation, unless the swelling soon breaks. But the most dangerous kind is, when, besides the above symptoms, the horse runs at the nose; this by some is called the bastard strangles.

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As this disorder seems to be critical, the most approved method is to assist nature in bringing the swellings to maturity, by keeping them constantly moist with ointment of marshmallows, and covering the head and neck with a hood. But as all swellings in glandular parts suppurate slowly, the following poultice may be applied hot twice a day: it is also a very proper one to ripen, or bring any other swelling to matter.

Take leaves of marshmallows 10 handfuls; white lilly-root half a pound; linseed and fenugreek seed bruised, of each four ounces: boil them in two quarts of water till the whole is pulpy, and add four ounces of ointment of marshmallows, and a sufficient quantity of hogs-lard, to prevent its growing stiff and dry.

In five or six days, by these means, the matter is generally formed, and makes its way through the skin; and if the discharge is made freely and with ease, the opening need not be enlarged; but should be dressed with the following ointment spread on tow, still continuing the poultice over it to promote the digestion, and prevent any remaining hardness.

Take rosin and Burgundy pitch, of each a pound and a half; honey and common turpentine, each eight ounces; yellow wax, four ounces; hogs-lard, one pound; verdigrease finely powdered, one ounce: melt the ingredients together, but do not put in the verdigrease, till removed from the fire; and it should be stirred in by degrees, till the whole is grown stiff and cool.

If the fever and inflammation run high, and the swelling be so situated as to endanger suffocation, a moderate quantity of blood must be taken away, and the remainder diluted with plenty of water-gruel, or warm water, mashes, &c.

The running at the nose, which often attends the strangles, is dangerous; especially if it continues after they have ripened and broke, as the horse will be greatly weakened thereby. To prevent this waste and decay, give him every day for some time an ounce of Jesuits bark; or a strong decoction of guaiacum shavings, which hath been found extremely beneficial in restraining these glandular discharges when too liberal, and in drying up ulcers of all kinds in horses. See GLANDERS. If a hardness remains after the sores are healed up, they may be anointed with the mercurial ointment; and when the horse has recovered his strength, purging will be necessary.

STRANGURY, in medicine, a partial suppression of urine; when it is total, it is called ischuria. These cases are either true or spurious; true, if the suppression happens while the bladder is full; but spurious, when, through some fault in the parts, there is no separation made of the urine, so that the bladder remains empty.

Paralytick or convulsive motions in the sphincter vesicæ may cause these disorders. The neck of the bladder may be also too closely shut by tumours, scirrhosities, inflammations, cittosities, caruncles, the stone, &c. The fœtus likewise, by pressing hard upon the neck of the bladder, may give a rise hereto; the intestinum rectum being fitted with indurated fæces, or the hæmorrhoids being greatly swelled internally. This suppression may likewise happen from the urine being long detained; which distending the bladder, may press its neck against the adjacent parts so hard, as to hinder the exclusion of its contents. A suppression of the urine also must necessarily ensue, when the serum of the blood is not duly separated, as in dropsies; so likewise in luxations of the vertebræ of the back in fevers; or when the kidnies or ureters are obstructed, &c. When this distemper proceeds from the stone, caruncles, tumours, &c. it is known by introducing the catheter. The other symptoms are easily discovered from the relaxation of the patient. If it proceed from inanition, no tumour appears, there is a little pain, and the desire of making water returns less frequently, nor is there any weight or pressure perceivable in the abdomen; all which symptoms attend when it proceeds from repletion.

An ischuria is more dangerous than a strangury, and, if it continues long, proves always mortal; especially, if it be from repletion, or when the spinal vertebræ are broke. The suppression continuing, and hiccup supervening, is accounted a sign of death.

STRATA, in natural history, the several beds or layers of different matters whereof the body of the earth is composed. The strata include all the layers of earths, minerals, metals, stones, &c. lying under the upper tegument or stratum, the turf or mould. The time when these several strata were laid was doubtless at the creation; unless with some great naturalists, as Stheno, Dr. Woodward, &c. we suppose the globe of the earth to have been dissolved by the flood.

At that time, says Mr. Derham, whenever it was, when the terrestrial globe was in a chaotick state, and the earthly particles subsided, then these several beds were reposited in that commodious order in which they are now found; and that, as is asserted, according to the laws of gravity, the lower still heavier than the upper.

But Dr. Leigh, in his natural history of Lancashire, speaking of the coal-pits, denies the strata to be according to the laws of gravitation; observing that the strata there are first a bed of marle, then free-stone, next iron-stone, then coal, or channel mire, then some other strata, then coal again. This determined Dr. Derham to make a nicer inquiry into the matter; accordingly, in 1712, he caused divers places to be bored, laying the several strata by themselves, and afterwards determined very carefully their specifick gravity. The result was, that, in his yard, the strata were gradually specifically heavier and heavier, the lower and lower they went; but, in another place in his field, he could not perceive any difference in the specifick gravities. Acquainting the Royal Society therewith, their operator, Mr. Hauksbee, was ordered to try the strata of a coal-pit, which he did to the depth of 30 strata: the thickness and specifick gravity of each whereof he gives us in a table in the Philosophical Transactions, and from the whole makes this inference, that it evidently appears the gravities of several strata are in no manner of order, but purely casual, as if mixed by chance.

STRATARITHMOMETRY, in war, the act of drawing up an army, or any part of it, in any given geometrical figure; and of expressing the number of men contained in such a figure, as they stand in array either near at hand, or at any distance assigned.

STRATAGEM, or STRATEGEM, in the art of war, any device for the deceiving and surprising an enemy.

STRATIFICATION, in chymistry, the ranging any thing to be calcined in several layers or strata, one above another; which operation is denoted by the abbreviation *s. s. s.*

STRAWBERRY, *Fragaria*, in botany, a genus of plants, whose flower consists of five roundish patent petals, disposed in the form of a rose, and inserted in the cup; the stamina are 20 subulated filaments, topped with lunulated antheræ; the germina are small, numerous, and collected into a head, which afterwards becomes a well known large soft pulpy fruit, containing a great number of small angular seeds.

There are several kinds of strawberries, as the common or wood-strawberry, the white wood-strawberry, the hautboy-strawberry, the scarlet-strawberry, the large Chili-strawberry, the green or pine-apple strawberry; the first and second sorts are found wild in the woods, from whence they are transplanted into gardens, by which the fruit is much improved. The best soil for these plants is a fresh loam. They are all propagated from runners, which they produce in great plenty in July; and if the weather is moist, they quickly take root, which when they have sufficiently obtained, should be planted out where they are intended to fruit, taking the opportunity of moist weather; they should be planted in beds about three feet and a half wide, leaving a path for the conveniency of watering and gathering the fruit. The wood-strawberry may be planted at about six inches asunder, but the other sorts require a greater distance. When the fruit is ripe and gone, the runners should be taken off, and the old plants cleaned of decayed leaves, and the earth stirred about them. These will not last well above three years; therefore there should be a fresh plantation made every year, in order to have the quantity required. If the weather is dry when they are in flower, it is necessary to water them on evenings, but not to wet the blossoms. In autumn, the walks between the beds should be dug up, and a little fine earth thrown

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on the beds, so as not to bury the plants; this will greatly strengthen them for fruiting the following year.

Strawberries do very well forced in the spring, either on hot-beds or in a stove; in the latter they should be planted in pots the preceding autumn, and about Christmas, and placed in the front of the place where they can conveniently stand: the most common sorts forced are the wood and scarlet strawberries, which, if properly managed, will produce ripe fruit in February; and by putting them in at different periods, may be continued till those in the natural ground are ripe. To have strawberries in autumn, the best method is to cut them down when in flower at the natural season, afterwards a second crop of blossoms succeeds, and the fruit ripens in September and October.

Strawberry-leaves are frequently used in gargarisms for sore mouths, quinsies, and ulcers of the throat.

The fruit is very grateful both to the palate and stomach, abating heat, quenching thirst, loosening the belly, promoting urine, and expelling small gravel.

STRAY, or ESTRAY, in law. See ESTRAY.

STRENGTH, *Vis*, in physiology, the same with force.

STRENGTHENERS, in pharmacy, medicines that add to the bulk and firmness of the solids: and such are all absorbent, agglutinant, and astringent medicines.

STRIATED, among botanists, a term applied to those leaves or fruit which have a number of longitudinal furrows on their surfaces.

STRICTOR, in anatomy, the same with constrictor and sphincter.

STRIKE, a measure of capacity, containing four bushels.

STRIKE, among seamen, is a word variously used; when a ship, in a fight, or on meeting with a ship of war, lets down or lowers her top-sails, at least half-mast high, they say she strikes, meaning she yields, or submits, or pays respect to the ship of war. Also, when a ship touches ground, in shoal-water, they say she strikes. And when a top-mast is to be taken down, the word of command is, Strike the top-mast, &c.

STROBILUS, among botanists, a kind of pericarpium, formed of an amentum. It consists of a number of vaginæ, with contorted points applied to each other.

STROPHE, in ancient poetry, a certain number of verses, including a perfect sense, and making the first part of an ode. See ODE.

STRUMÆ, scrophulous tumours arising on the neck and throat, constituting what is commonly called the king's evil. See SCROPHULA.

STRUMPFIA, in botany, a genus of plants, whose flower consists of five oblong, obtuse, patent petals, with the same number of ovate antheræ joined in a body; the fruit is a roundish, unilocular berry, crowned with the cup, and contains a roundish seed.

STUCK, or STUCCO, in building, a composition of white marble pulverized and mixed with plaster of lime; and the whole being sifted and wrought up with water, is to be used like common plaster: this is what Pliny means by marmoratum opus, and albarium opus.

STUFF, in commerce, a general name for all kinds of fabricks of gold, silver, silk, wool, hair, cotton, or thread, manufactured in the loom; of which number are velvets, brocades, mohairs, sattins, taffeties, cloths, serges, &c.

STUM, in the wine-trade, denotes the unfermented juice of the grape, after it has been several times racked off, and seperated from its sediment. The casks are, for this purpose, well matched, or fumigated with brimstone every time, to prevent the liquor from fermenting, as it would otherwise readily do, and become wine. See MATCHING.

It is this fume of the sulphur from the match, that prevents, in this case, all tendency to fermentation, and continues the natural juice of the grape in a sweet taste, fit to be readily mixed with wines instead of sugar; for which purpose it is very much used in Holland, and some other countries; as also for giving a new fret, or briskness to decayed wines; so that very large quantities of this stum are annually imported to all parts, along with the foreign wines. And after the same manner a stum is prepared in England from the juice of apples, which serves the ordinary purposes of the wine-cooper. In the preserving this liquor in this state, we see the vast use of brimstone, for it could never be done otherwise than by the matching of the casks.

Dr. Shaw gives the following method of preparing an artificial stum, nothing inferior to the natural; and as fit for the refermenting, fretting, improving, or making of wines, vinegars, and spirits. Take three pounds of fine lump sugar, or such as has been well refined from its treacle; melt it in three quarts of water, and add, in the boiling of rhenish tartar, finely powdered, half an ounce; this dissolves with a remarkable ebullition, and gives a grateful acidity to the liquor; take the vessel from the fire, and suffer it to cool, and you have an artificial must, which in all respects resembles the natural tast eand sweet juice of a white flavourless grape, when well purified, and racked off from its sediment, in order to make stum. If this artificial must be stummed, that is, well fumigated with burning brimstone, it becomes a perfect stum, and may be made of any flavour, at the discretion of the artist.

STUPOR, a numbness in any part of the body, whether occasioned by ligatures obstructing the blood's motion, by the palsy, or the like.

STURGEON, *Sturio*, in ichthyology, a very large fish, growing to 14, 16, or 18 feet in length; though the greater part are caught much smaller. There are four cirri at the extremity of the under jaw; the eyes are large; and stand at a great distance from the extremity of the rostrum or snout: but what is very singular in the sturgeon, are the spinose tubercles, of which there are several series or rows.

STYE, or STITHE, a disorder of the eye-lids; being a small encysted tumour, about the bigness of a barley-corn. The stye frequently occasions much pain and uneasiness, and must be treated with great caution, on account of the tenderness of the eye. Some recommend cataplasms, and the like applications; but the eye is often hurt by those, and it is observed besides, that these tubercles seldom give way to topical applications of any kind. When they are small, Heister thinks it best to let them take their own course; but if so large as to occasion deformity, or danger of hurting the sight, the way to extirpate them, is to make a longitudinal incision on the part, and carefully take them out whole; or, if it cannot be thus got out clean, it must be cut out, as far as may be done, with scissars, and dressed with Egyptian ointment, and a little red precipitate, or touched at times with the common caustick, till eaten thoroughly away, and then the wound dressed and healed in the common manner.

This is the method by which the flat and broad-bottomed tumours of this kind are to be extirpated; and in this, great care must be taken that none of the sharp applications touch the eye, as they might injure the sight. It is common, however, with these tumours, to hang by a sort of small root, and then they are much more easily managed, there being no more necessary than the cutting them close off with a pair of scissars, or the tying them firmly round with a piece of silk or horse-hair. They are sometimes, if taken in time, dispersed by rubbing them with fasting-spittle, or by applying the pulp of a roasted apple mixed with some saffron and camphor.

STYGIAN LIQUORS, an appellation given to caustick and corrosive waters, and particularly to aqua-regia. See AQUA.

STYLE, a word of various significations, originally deduced from στυλος, a kind of bodkin, wherewith the ancients wrote on plates of lead, or on wax, &c. and which is still used to write on ivory-leaves, and paper prepared for that purpose, &c.

STYLE, in botany, is that part of the pistillum, or female organ of generation, which serves to elevate the stigma from the germen, on the top of which it is generally placed, and is of various figures. In some genera it is very short, as in the sarracenia; and in others is entirely wanting, as in celandina and poppy.

STYLE, in dialling, denotes the gnomon or cock of a dial, raised on the plane thereof, to project a shadow.

STYLE, in matters of language, a particular manner of expressing one's thoughts agreeably to the rules of syntax; or, as F. Buffier more accurately defines it, the manner wherein the words, constructed according to the laws of syntax, are arranged among themselves, suitably to the genus of the language.

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From this deſcription it appears, that the ſtyle ſuppoſes or includes the ſyntax; and that ſyntax does not extend ſo far as ſtyle, for the ſyntax may be juſt where the ſtyle is wretched.

A fault in ſtyle is not leſs a fault againſt grammar, than is a fault in ſyntax; only the former is leſs preciſe and palpable than the other. A very common error in grammarians, F. Buffier adds, is to confound two kinds of ſtyle in one: grammatical ſtyle, or that directed by the rules of grammar; and the perſonal ſtyle, which depends leſs on the grammar than on the perſon that writes, whether with regard to his particular taſte and genius, or with regard to his matter, or the kind or character of his work. There are a great many differences between the two; the moſt eſſential is, that the one may be diverſified an infinite number of ways, and the other cannot. In effect, the perſonal ſtyle is naturally variable, according to the different genius, humours, and complexion.

It is the imagination that acts, that conceives, that propoſes, and that expreſſes things, according to its character, which is different in all men, and which is to be varied according to the particular kind of the work. Hence ariſe the gay, the grave, the florid, the jejune, the copious, the conciſe, the poetical, the epiſtolary, and the burleſque ſtyles. Theſe perſonal ſtyles are all independent on the grammatical; and we have authors who excel in the one, and are miſerably defective in the other. The perſonal ſtyle is not under the direction of grammar, but of the imagination, or rather of rhetorick, that art having to do directly with our thoughts, as grammar with our words. This, however, may be ſaid, that grammar is far from being able to vary the ſame words of a phraſe, with equal perfection; and that there is but one way of delivering them in the taſte and genius of the language.

In oratory and poetry, ſtyle is reſtrained wholly to what F. Buffier calls the perſonal ſtyle. Language refers principally to the matter of the diſcourſe, viz. the words; elocution to the particular members or parts thereof; and ſtyle to the whole compoſition.

The maſters of the art reduce the kinds of ſtyle to three; the ſublime, the low, and the intermediate or equable ſtyle. The ſublime ſtyle, is that conſiſting in magnificent words and ſentences; which, by its noble boldneſs, raviſhes the hearers, and extorts admiration, even from the unwilling. See Sublime.

Low, or ſimple ſtyle, is that ordinarily uſed in ſmaller or humbler works, as epiſtles, dialogues, and common diſcourſe. The chief virtues hereof are perſpicuity, ſmoothneſs, eaſineſs, and cleanlineſs. It muſt be very ſparing in the uſe of tropes and figures, eſpecially the more violent ones, as the proſopopœia, apoſtrophe, &c.

Intermediate, or equable ſtyle, partakes of the magnificence of the ſublime, and the ſimplicity of the low. It neither riſes to the majeſty of the one in words and ſentences, nor yet is ſmartly pointed like the other. Tully calls this the poliſhed and florid ſtyle; it being in this, that all the graces and beauties of language are principally to be uſed.

As to the choice of ſtyle, in the general, the nature of the ſubject is to determine it.

Such ſtyle, ſays Cicero, is to be choſen, as expreſſes great things magnificently, middle things moderately, and low things ſubtilly: but more particularly, as there are three branches of the duty of an orator, to teach, to delight, and to move; the ſimple ſtyle is uſed to teach, the middle to delight, and the ſublime to move.

Again, the ſimple or low ſtyle is fit for comedy, the ſublime for tragedy, and the middle for hiſtory. Again, the ſimple ſtyle is fit for bucolicks and eclogues, the intermediate for georgicks, and the ſublime for epicks: which triple difference we may diſcern in Virgil, though he ſometimes mixes them all in the Æneid itſelf, uſing the ſimple ſtyle in the fifth book, where he deſcribes games; and the intermediate in the beginning of the poem.

Care is ſtill to be taken that the ſtyle be not flat and dull, on pretence of being ſimple.

Old-Style, the Julian manner of computing times, as the

New-Style is the Gregorian method of computation. See Julian, Gregorian, Bissextile, &c.

STYLITES, an appellation given to a kind of ſolitaries, who ſpend their lives ſeated on the tops of columns, to be, as they imagine, the better diſpoſed for meditation, &c. Of theſe we find ſeveral mentioned in ancient writers, and even as low as the 11th century. The founder of the order was St. Simon Stylites, a famous anchoret in the fifth century, who took up his abode on a column, ſix cubits high; then on a ſecond, of 12 cubits; a third, of 22; and, at laſt, on another, of 36. The extremity of theſe columns were only three feet in diameter, with a kind of rail or ledge about it that reached almoſt to the girdle, ſomewhat reſembling a pulpit. There was no lying down in it. The faquirs, or devout people of the Eaſt, imitate this extraordinary kind of life even to this day.

STYLOGLOSSUS, in anatomy, a muſcle ariſing from the apex of the ſtyloide proceſs; and, deſcending obliquely to the ſide and root of the tongue, moves it ſideways, backwards, and forwards.

STYLOHYOIDÆUS, in anatomy, a pair of muſcles ariſing in the ſtyloide proceſs, and terminating in the horn and the baſe: this is often perforated by the digaſtrick muſcle of the jaw. Theſe muſcles draw laterally upwards.

STYLOIDES, in anatomy, an apophyſis of the os petroſum; thus called, from its reſembling a ſtyle or ſtylet.

STYLOPHARYNGÆUS, in anatomy, one of the ſix pair of muſcles which ſerve to dilate the pharynx. The ſtylopharyngæus ariſes from the beginning of the ſtyloide proceſs, and is inſerted on both ſides into this and into the thyroide proceſs: it ſerves alſo to elevate as well as dilate the pharynx.

STYPTICK, in pharmacy, medicines which, by their aſtringent qualities, ſtop hæmorrhages. See Agarick.

STYRAX, in botany, the ſtorax tree, is a native of ſeveral parts of Europe, and of the eaſt. The gum which is obtained by making inciſions on its trunk, is uſed medicinally. See Storax.

SUBALTERN, a ſubordinate officer, or one who diſcharges his poſt under the command, and ſubject to the direction of another; ſuch are lieutenants, ſub-lieutenants, cornets, and enſigns, who ſerve under the captain; but cuſtom has now appropriated the term to thoſe of much lower rank, as ſerjeants, and the like. We alſo ſay ſubaltern-courts, juriſdictions, &c. ſuch are thoſe of inferior lords, with regard to the lord paramount; hundred-courts, with regard to county-courts, &c.

SUBCLAVIAN, *Subclavius*, in anatomy, is applied to any thing under the arm-pit or ſhoulder, whether artery, nerve, vein, or muſcle. Subclavius more particularly denotes a ſmall oblong muſcle lying between the clavicle and firſt rib. It is fixed by one end in the middle lower portion of the clavicle, at the diſtance of about an inch from each extremity, and by the other in the cartilage, and a ſmall part of the bone of the firſt rib.

SUBCOSTAL Muscle, *Subcoſtales*, in anatomy. Theſe muſcles are fleſhy planes of different breadths, and very thin, ſituated more or leſs obliquely in the inſide of the ribs, near their bony angles, and running in the ſame direction with the external intercoſtals. They are fixed by other extremities in the ribs, the inferior extremity being always at a greater diſtance from the vertebræ than the ſuperior, and ſeveral ribs lying between the two inſertions. Theſe muſcles are more ſenſible in the lower ribs than in the upper, and they adhere cloſely to the ribs that lie between their inſertions.

SUBCUTANEOUS, in anatomy, a thin membranous muſcle, running under the ſkin, called alſo quadratus genæ, and platiſma myoides. It ariſes with a pretty broad origin from the hind part of the neck, and from the pectoral muſcle below the clavicle. It adheres firmly to the paniculus cornoſus, from which it is not ſeparated without difficulty, and therefore it was not anciently diſtinguiſhed from it. It is inſerted obliquely on each ſide into the lower jaw bone, near the ſkin, lips, and ſometimes the bottom of the noſe, all which parts it draws downwards and awry. A convulſion herein is called the cynick ſpaſm. In ſome perſons it reaches to the ears, which is the reaſon that ſome have the faculty of moving their ears which others want.

SUBDUCTION, in arithmetick, the ſame as ſubtraction. See Subtraction.

SUBDUPLE Ratio, is when any number or quantity

tity is contained in another twice; thus 3 is said to be subduple of 6, as 6 is duple of 3.

SUBDUPLICATE RATIO, of any two quantities, is the ratio of their square roots. See RATIO.

SUBJECT, *Subditus*, a person under the rule and dominion of a sovereign prince or state.

SUBJECT, *Subjectum*, is also used for the matter of an art or science, or that which it considers, or wherein it is employed. Thus the human body is the subject of medicine.

The surgeons call the body they are dissecting, and whereon they read lectures, their subject. The subject of logick is thinking or reasoning; but more particularly in a syllogism one of the terms of a proposition is called the subject, and the other the attribute. In poetry, the subject is the matter treated of, or the event related or set to view. Subject also denotes the substance or matter to which an accident is added, whence the maxim that two contraries can never subsist in the same subject.

SUBJUNCTIVE, in grammar, the second mood of verbs, thus called because subjoined to another verb, or particle at least, and not standing alone in a sentence: thus, Orat ut ad se venias. Quid faciam prorsus ignoro. Though this were true, &c.

SUBLAPSARIANS. See SUPRALAPSARIANS.

SUBLIMATE, a chymical preparation, the basis whereof is mercury or quicksilver. There are two kinds of sublimate, corrosive sublimate, and sweet sublimate, or mercurius dulcis sublimatus; which see under the article MERCURY.

SUBLIMATION, the condensing and collecting in a solid form, by means of vessels aptly constructed, the fumes of bodies raised from them, by the application of a proper heat. Sublimation is in all respects the same with distillation, except that in the first the produce is solid, but in the latter fluid. The only variation, therefore, necessary in the operation, is the accommodating the recipient part of the apparatus to this difference, which admits, in most cases, that one vessel may perform the office both of condenser and receiver, as the matter cannot, like fluids, flow to another part, but must remain where it first settles, except in some instances, where the matter is extremely volatile, or where a fluid rising with it renders a depending receiver necessary.

The vessels proper, in respect of the different subjects of this operation, vary in their structure and the substance of which they are made, as well on account of the degree of heat requisite to be employed, as the nature of the matter to be sublimed, since corrosions of them are here, and indeed in all other cases, to be carefully avoided.

In sublimations of mercury, whether combined with acids or sulphur, of sal ammoniacum and of sulphur alone, a single vessel may answer all the purposes, as their necessity of a great heat to keep them in the condition of fumes, renders the upper part of the glass capable of detaining them when they are raised thereto; but it is proper, in these instances, that a glass in sand, or earthen ware, should be used. A glass body, in a strong sand heat, may very well serve for all these; but sublimate of mercury is frequently sublimed in a bolt-head, or matrass; and the factitious cinnabar, by those who make large quantities, in an earthen vessel made in the shape of an egg.

In the sublimation of volatile salt of amber, and flowers of Benjamin, a container and condenser are separately necessary, and may in all these cases be extremely well supplied by a retort and receiver, though bodies with alembick heads, and receivers of glass fitted to them, have been generally recommended in several of them; but the trouble of luting two junctures, and the difficulty of fitting them to each other, with several other reasons, make retorts far more convenient. A retort and receiver are likewise proper in the case of cinnabar of antimony; for though the cinnabar might be restrained in one glass, the butter of antimony makes the receiver necessary.

In sublimations of factitious cinnabar, mercury sublimate, and sal ammoniacum, it is sufficient to cover the aperture or neck of the vessel with a tile; and in the sublimation of cinnabar of antimony, and flowers of Benjamin, in retorts, it is unnecessary to lute on the receiver; but in the sublimation of volatile salts, it is requisite to lute the vessels as secure as possible, leaving only a small vent till they attain the greatest heat they are to suffer during the operation. The requisite degree of heat in sublimation varies in almost every different subject of the operation. The limits are from the greatest degree that can be given in sand, to a degree something less than that which will make water boil.

Hoffman observes, that only those things are sublimable which contain a dry exhaleable matter in their original construction, and among these is found a great variety, which require various methods and means to execute that effect. Among the minerals, sulphur, antimony, and orpiment, are named as the principal sublimable bodies: these are of a very lax compage or structure, and easily raised by fire in small particles, which concrete again on being stopped from flying off by the cover of the vessel; while, on the contrary, iron, silver, and the other metals, being of a closer structure, remain fixed in the greatest heat, and never ascend without being mixed with some volatile substance that is of itself capable of rising and taking up some of them with it. Thus copper and iron will be raised in sublimation by means of sal ammoniack mixed with them; and even gold itself is said to be subject to the same law; Mr. Boyle assuring us, that he had a secret method of preparing a certain saline substance, by means of a very small admixture of which, gold would be made to rise in sublimation, and form fine pure crystals.

The admixtures which make bodies sublimable that are not so in themselves, are to be of various kinds, according to the nature of the body to be sublimed. Among these, some act by rendering the body more easily fusible, and disuniting those particles more readily which the fire is expected to carry up: others act again by preventing the cohesions of the particles of the substance to be sublimed, which heat would otherwise occasion: and, finally, others by entering the body of the fixed substance they are mixed with, and giving wings, as it were, to its subtle particles, so that they may ascend with its easily sublimable matter, and join with it in the formation of one mixed substance in the top of the vessel, by partaking of the nature of both. Others act potentially in the same way, but by different means, themselves not being capable of sublimation, but acting on the substance to be sublimed, by enervating, weakening, or absorbing those substances, or parts, of the mixed body, which would otherwise have prevented the ascent of the rest: and, finally, some act as dissolvents only, and by that means render things easy of sublimation, which would have been very difficultly so, while their parts were in a more strict continuity.

Explanation of *plate* LXXV. representing the manner of extracting mercury from its ore, or cinnabar.

The lower compartment of the plate represents the several operations generally practised in Germany for revivifying the mercury from the ore of cinnabar.

Fig. 1. A workman filling a pot with pieces of cinnabar, and stopping the mouth with moss; the pot is made of crucible earth, and used instead of a retort, for holding the mineral ore. It is fitted and luted to a receiver, represented at G, F, G, is one of these pots and its receiver luted together.

Fig. 2. A workman stirring with a long pole, the fire made on the crowns of the earthen pots, described in the first figure, in order to keep up the proper degree of heat necessary for performing the process of distillation per descensum, by which the mercury is extracted from the ore. The furnace is composed of large stones, forming a wall, a little higher than the earthen pots when mounted upon, and their mouths luted into the aperture of the receivers placed in sand. The fuel is wood, long pieces of which, or large branches of trees, and of a length sufficient to reach from one side of the furnace to the other, are placed over the pots, and the two ends rest on the walls on each side of the furnace, without touching the crowns of the earthen pots. These pieces therefore form a kind of grate on which the wood or faggots are placed, and the interstices between the pots filled with powder of charcoal. The whole is then set on fire, and a very intense heat is produced, which volatalises the mercury, which then quits the cinnabar, and passes in vapours through the mouth of the pot into the receiver, where it is condensed by the coldness of the sand, in which the receivers are placed. The workman who stirs the fire, is very careful to avoid the arsenical and other poisonous

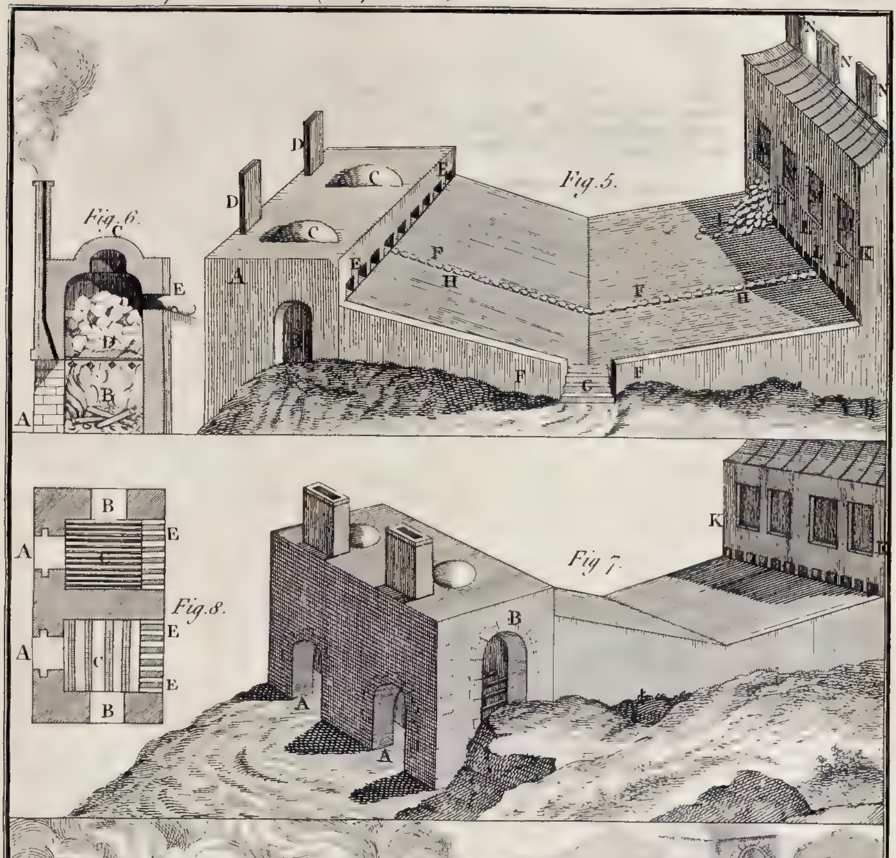

Plate LXXV

facing Sublimation.

vapours which are elevated with the ſmoke. A, B, B, the large pieces of wood which form the grate, mentioned above. C, an empty furnace.

Fig. 3. A furnace filled with earthen pots, mounted upon their receivers without being covered with its wood. D, D, D, the walls of the furnace. F, F, F, F, the earthen pots, luted to their receivers, bedded in ſand.

Fig. 4. F, F, F, a number of earthen pots, placed near the workman, *fig.* 1.

The upper compartment of the plate, is a perſpective view, ſection, and plan of the furnace uſed at Almada in Spain, for extracting mercury from its ore or cinnabar.

Fig. 5. A perſpective elevation of the furnace for the ſeparation of mercury. A, two furnaces joined together, and in which ſmall pieces of cinnabar are arranged, for extracting the mercury. B, the door of the two furnaces, repreſented open. The floor of the paſſage from this door is on a level with the grate; and in this paſſage the workmen charge the grate with ſmall pieces of cinnabar. The grate is conſtructed of bricks. C, and C, apertures in the domes of the two furnaces, through which they finiſh the charge. Theſe apertures are covered with bricks, well luted with earth. The door D, D, is alſo cloſed with the ſame materials. D, D, the funnels of the chimnies of the two furnaces. E, E, a number of apertures, into which the mouths of the aludels are luted. F, F, F, F, terraſſes inclined in contrary directions, upon which a number of aludels, luted together, are arranged, and by which a communication is opened between the furnace A and the chamber K, which ſerves as a recipient or receiver for the mercury. G, ſtairs for aſcending the terraſes. H, a row of aludels luted to one another, connected at one end to one of the apertures of the furnace B, and at the other to one of the mouths L, L, L, of the chamber K, which forms the receiver. I, aludels to which others being luted, form more rows. K, a building divided into four chambers, in which the vapours conducted by the rows of aludels, are condenſed and collected. L, L, L, apertures, or mouths, of the chambers, which form the recipients, and through which the rows of aludels, continued from the furnaces to theſe chambers, conduct the mercurial vapours. M, M, M, M, windows, by which they enter the chambers, and which are cloſed with bricks luted together with clay during the operation. N, N, N, chimnies, through which the ſuperfluous vapours conveyed by the aludels, after having depoſited their mercurial particles, make their eſcape.

Fig. 6. A longitudinal ſection through the fire-place. A, one ſide of the fire-place, through which the wood is introduced, and below which is the aſh-hole. B, the fuel in flames. D, the grate conſtructed of bricks, in the form repreſented in the figure, and upon which the ore is placed. C, the crown of the dome of the furnace. E, aludels luted to one of the apertures of the furnace. It is plain from the figure, that the ſmoke from the wood is carried off by the chimney wall in the wall of the furnace, without entering the internal part filled with the ore.

Fig. 7. A perſpective elevation of the ſide of the furnace where the fire is made. A, A, mouths of the fire-places below the grate, and into which the fuel is introduced. B, the door for charging the furnace. It is cloſed up with bricks and earth, during the ſublimation of the mercury. K, K, the building that contains the four chambers which ſerve for receivers.

Fig. 8. Plan of that part of the furnace where the grates are placed. A, A, the fire hearths under which are the holes. B, B, the doors for charging the furnace. C, C, the interior parts of the furnaces. E, E, E, the apertures, into which the aludels are luted.

SUBLIME, is a certain eminence or perfection of language, ſays Longinus, and that the greateſt writers, both in verſe and proſe, have by this alone obtained the prize of glory, and filled all time with their renown. See Style. He makes five ſources of the ſublime: the firſt, a certain elevation of the mind, which makes us think happily: the ſecond is the pathetick, or that natural vehemence and enthuſiaſm which ſtrikes and moves us; theſe two are wholly owing to nature, and muſt be born with us; whereas the reſt depend partly on art: the third is the turning of figures in a certain manner, both thoſe of thoughts and of ſpeech: the fourth, nobleneſs of expreſſion; which conſiſts of two parts, the choice of words, and the elegant figurative diction: the fifth, which includes all the reſt, is the compoſition and arrangement of the words in all their magnificence and dignity.

SUBMULTIPLE, in geometry, &c. A ſubmultiple number, or quantity, is that which is contained a certain number of times in another, and which, therefore, repeated a certain number of times, becomes exactly equal thereto: thus 3 is a ſubmultiple of 21; in which ſenſe ſubmultiple coincides with an aliquot part.

Submultiple Ratio, is that between the quantity contained and the quantity containing: thus the ratio of 3 to 21 is ſubmultiple. In both caſes ſubmultiple is the reverſe of multiple, 21, e. g. being a multiple of 3, and the ratio of 21 to 3 a multiple ratio. See Ratio.

SUBNORMAL, in geometry, a line which determines the point in the axis of a curve, where a normal or perpendicular, raiſed from the point of contact of a tangent to the curve, cuts the axis. Or the ſubnormal is a line which determines the point wherein the axis is cut by a line falling perpendicularly on the tangent in the point of the contact.

SUBPŒNA, in law, a writ whereby all common perſons, or thoſe under the degree of peerage, may be called into chancery, in any caſe where the law cannot afford a remedy.

SUBREPTION, *Subreptio*, the act of obtaining a favour from a ſuperior, by ſurpriſe, or a falſe repreſentation. See the next article.

SUBREPTITIOUS, or Surreptitious, a term applied to a letter, licence, patent, or other act, fraudulently obtained of a ſuperior, by concealing ſome truth, which, had it been known, would have prevented the conceſſion or grant; in which caſe, the benefits of letters, licences, &c. are forfeited.

SUBROGATION, or Surrogation, in the civil law, the act of ſubſtituting a perſon in the place, and entitling him to the rights of another: but, in its general ſenſe, ſubrogation implies a ſucceſſion of any kind, whether of a perſon to a perſon, or of a perſon to a thing.

SUBSCAPULARIS, in anatomy, a muſcle ariſing from the baſis and ſide of the ſcapula, and, ſpreading itſelf under the whole convex or under ſide of it, is inſerted by a ſemi-circular tendon, into the neck of the os humeri, and draws it down to the ſide of the trunk.

SUBSCRIPTION, in general, ſignifies the ſignature put at the bottom of a letter, writing, or inſtrument. Merchants uſe it to ſignify the ſhare or intereſt, which particular perſons take in a publick ſtock, or a trading company, by writing their names, and the ſhares they require, in the books or regiſter thereof.

Subſcription, among bookſellers, ſignifies an engagement to take a certain number of copies of a book intended to be printed, and a reciprocal obligation of the bookſeller, or publiſher, to deliver the ſaid copies, on certain terms.

SUBSEQUENT, ſomething that comes after another, particularly with regard to the order of time.

SUBSIDY, in law, ſignifies an aid or tax granted to the king by parliament, for the neceſſary occaſions of the kingdom; and is to be levied on every ſubject of ability, according to the rate or value of his lands or goods: but this word, in ſome of our ſtatutes, is confounded with that of cuſtoms.

SUBSISTENCE, in the military art, is the money paid to the ſoldiers weekly, not amounting to their full pay; becauſe their cloaths, accoutrements, tents, bread, &c. are to be paid. It is likewiſe the money paid to officers upon account, till their accounts be made up, which is generally once a year, and then they are paid their arrears.

SUBSTANCE, *Subſtantia*, ſomething that we conceive to ſubſiſt of itſelf, independently of any created being, or any particular mode or accident.

Our ideas of ſubſtances, Mr. Locke obſerves, are only ſuch combinations of ſimple ideas as are taken to repreſent diſtinct things ſubſiſting by themſelves, in which the confuſed idea of ſubſtance is always the chief. Thus the combination of the ideas of a certain figure, with the powers of motion, thought and reaſoning joined to the ſubſtance, make the ordinary idea of a man: and thus the mind obſerving ſeveral ſimple ideas to go conſtantly

ſtantly together, which being preſumed to belong to one thing, or to be united to one ſubjeﬅ, are called by one name, which we are apt afterwards to talk of, and conſider, as one ſimple idea.

We imagine theſe ſimple ideas do not ſubſiſt by themſelves, but ſuppoſe ſome ſubſtratum wherein they ſubſiſt, which we call ſubſtance. The idea of pure ſubſtances is nothing but the ſuppoſed, yet unknown ſupport of theſe qualities, which are capable of producing ſimple ideas in us. The ideas of particular ſubſtances are compoſed out of this obſcure and general idea of ſubſtance, together with ſuch combinations of ſimple ideas as are obſerved to exiſt together, and ſuppoſed to flow from the internal conſtitution and unknown eſſence of that ſubſtance. Thus we come by the ideas of man, horſe, gold, &c. Thus the ſenſible qualities of iron, or a diamond, make the complex ideas of thoſe ſubſtances, which a ſmith, or a jeweller, commonly knows better than a philoſopher. The ſame happens concerning the operations of the mind, viz. thinking, reaſoning, &c. which we concluding not to ſubſiſt by themſelves, nor comprehending how they can belong to body, or be produced by it, we think them the aﬅions of ſome other ſubſtance, which we call ſpirit, of whoſe ſubſtance or nature we have as clear a notion as of that of body, the one being but the ſuppoſed ſubſtratum of the ſimple ideas we have from without, as the other of thoſe operations which we experience in ourſelves within; ſo that the idea of corporeal ſubſtance in matter, is as remote from our conceptions, as that of ſpiritual ſubſtance.

Hence we may conclude, that he has the moſt perfeﬅ idea of any particular ſubſtance, who has colleﬅed moſt of thoſe ſimple ideas which do exiſt in it, among which we are to reckon its aﬅive powers and paſſive capacities, though not ſtriﬅly ſimple ideas.

Subſtances are generally diſtinguiſhed by ſecondary qualities, for our ſenſes fail us in the diſcovery of primary ones, as the bulk, figure, texture, &c. of the minute parts of bodies, on which their real conſtitutions and differences depend: and ſecondary qualities are nothing but powers with relation to our ſenſes. The ideas, that make our complex ones of corporeal ſubſtances, are of three ſorts: firſt, the ideas of primary qualities of things, which are diſcovered by our ſenſes; ſuch are bulk, figure, motion, &c. Secondly, the ſenſible ſecondary qualities, which are nothing but powers to produce ſeveral ideas in us, by our ſenſes. Thirdly, the aptneſs we conſider in ſubſtance, to cauſe or receive ſuch alterations of primary qualities, as that the ſubſtance ſo altered ſhould produce in us different ideas from what it did before; and they are called aﬅive and paſſive powers: all which, as far as we have any notice or notion of them, terminate in ſimple ideas.

Beſides the complex ideas we have of material ſubſtances, by the ſimple ideas taken from the operations of our own minds, which we experience in ourſelves, as thinking, underſtanding, willing, knowing, &c. coexiſting in the ſame ſubſtance, we are able to frame the complex idea of a ſpirit; and this idea of an immaterial ſubſtance is as clear as that we have of a material one. By joining theſe with ſubſtance, of which we have no diſtinﬅ idea, we have the idea of ſpirit; and by putting together the ideas of coherent, ſolid parts, and a power of being moved, joined with ſubſtance, of which likewiſe we have no poſitive idea, we have the idea of matter.

There are alſo other ideas of ſubſtances, which may be colleﬅive; which are made up of many particular ſubſtances conſidered as united into one idea, as a troop, army, &c. which the mind makes by its power of compoſition. Theſe colleﬅive ideas are but the artificial draughts of the mind, bringing things, remote and independant, into one view, the better to contemplate and diſcourſe of them united into one conception, and ſignified by one name; for there are no things ſo remote, which the mind cannot, by this art of compoſition, bring into one idea; as is viſible in that ſignified by the name univerſe.

SUBSTANTIAL, in the ſchools, ſomething belonging to the nature of ſubſtance.

SUBSTANTIVE, in grammar, a noun, or name, conſidered ſimply and in itſelf, without any regard to its qualities, or other accidents, in contradiſtinﬅion to the noun termed adjeﬅive, or that which expreſſes a certain quality or accident of the noun ſubſtantive. Or, a noun ſubſtantive is that noun, which, joined to a verb, makes a perfeﬅ ſentence, as a man, a horſe, a tree; thus, a man laughs, a horſe gallops, a tree buds, are each of them perfeﬅ ſentences. All nouns, to which one cannot add the word thing, are ſubſtantives; and thoſe to which thing may be added, are adjeﬅives.

SUBSTITUTE, a perſon appointed to officiate for another, in caſe of abſence, or other legal impediment.

Substitute, in medicine, denotes a drug or remedy that may be uſed inſtead of another; or that ſupplies the place of another of like virtue, which is not perhaps to be had; called alſo ſuccedaneum.

SUBSTITUTION, in grammar, the uſing one word for another. This the grammarians otherwiſe call ſyllepſis.

Substitution, in the civil law, a diſpoſition of a teſtament, whereby the teſtator ſubſtitutes one heir for another, who has only the uſufruﬅ, and not the property of the thing left him.

Substitution, in algebra, is the putting, in the room of any quantity in an equation, ſome other quantity, which is equal to it, but expreſſed in another manner.

SUBSTRACTION. See Subtraction.

SUBSTYLAR Line, in dialling, a right line on which the ſtyle or gnomen of a dial is ereﬅed.

SUBTANGENT *of a Curve*, the line which determines the interſeﬅion of the tangent with the axis; or that determines the point where the tangent cuts the axis prolonged.

SUBTENSE, in geometry. See Chord.

SUBTERRANEOUS, ſomething under ground.

SUBTILE, in philoſophy, ſomething exceedingly minute, fine and delicate.

SUBTRACTION, or Substraction, in arithmetick, the ſecond rule, or rather operation, in arithmetick, whereby we deduﬅ a leſs number from a greater, to learn their preciſe difference.

Prob. I. To ſubtraﬅ integers of like names, when the minuend, or number to be ſubtraﬅed from, is greater than, or equal to, the ſubducend, or that which is ſubtraﬅed.

Rule 1. Place the ſubducend under the minuend, and draw a line under both. 2. Begin at the right hand; take the leſs from the greater, or equals from equals, and ſet the difference of each row underneath.

Example in integers alone.

Minuend	638
Subducend	213
Remainder	425

Prob. II. To ſubtraﬅ integers of the ſame name or denomination, when ſome of the minuend numbers are leſs than their inferior in the ſubducend.

Rule 1. Place your numbers, and begin as before. 2. According to their reſpeﬅive value, take one of the next denomination, out of which ſubtraﬅ, and to the remainder add the minuend, ſetting their ſum underneath. 3. Then add what you took to the next place, on the left hand, and ſo proceed by this, or the former rule.

Example in integers alone.

From	2537
Subtraﬅ	1648
Remainder	889

For, by ſaying 8 from 17, I add 10 to the minuend; but I add alſo the ſame to the ſubducend, by ſaying 1 and 4=5, therefore the remainder muſt be the ſame.

For by adding a ten to the units, and taking it away from the tens, the value of the number is not changed.

Example in integers and parts.

	s.	*d.*
From	5	3
Subt.	2	9
Rem.	2	6

	l.	*s.*	*d.*
From	246	3	4
Subt.	68	10	6
Rem.	177	12	10

Theorem. In ſubtraﬅion, the ſubducend, together with the remainder, is equal to the minuend. For all the parts taken together are equal to the whole. And if the ſubducend be taken from the minuend, there reſts the remainder. But if a part be taken from the whole, the remainder will be the other part; therefore, the ſubducend,

ducend, together with the remainder, are all the parts of the minuend, and consequently equal to it.

Corollary. Hence addition and fubtraction ferve reciprocally to prove each other. See ADDITION.

For addition and fubtraction are oppofite in all cafes; and what is done by one, is undone by the other.

Thus, if to	6	And if from	10
be added	4	be fubtracted	4
the fum is	10	the remainder is	6

That is, if $6+4=10$, then $10-4=6$.

SUBTRACTION, in algebra, is performed by the following general rule; Change the figns of the quantity to be fubtracted into their contrary figns, and then add it, fo changed, to the quantity from which it was to be fubtracted, by the rules of addition; the fum arifing by this addition is the remainder.

For to fubtract any quantity, either pofitive or negative, is the fame as to add the oppofite kind. See the article ADDITION.

EXAMPLES.

From	$+5a$	$8a-7b$
Subt.	$+3a$	$3a+4b$
Rem.	$5a-3a$, or $2a$	$5a-11b$

From	$2a-3x+5y-6$
Subt.	$6x+4x+5y+4$
Rem.	$-4a-7x \quad 0-10$

It is evident, that to fubtract, or take away a decrement, is the fame thing as adding an equal increment. If we take away $-b$ from $a-b$, there remains a; and if we add $+b$ to $a-b$, the fum is likewife a. In general, the fubtraction of a negative quantity is equivalent to adding its pofitive value.

SUBTRIPLE RATIO, is when one number, or quantity, is contained in another three times: thus, 2 is faid to be fubtriple of 6, as fix is triple of 2.

SUBULARIA, in botany, a genus of tetradynameous plants, whofe flower confifts of four ovate intire petals, difpofed in the form of a crofs; the germen is ovate, with fcarce any ftyle; and the ftigma is obtufe: the fruit is an oval compreffed pod, having two cells, which contain a few very fmall roundifh feeds.

SUBULATED, fomething in the fhape of an awl: thus, a fubulated leaf is one of an oblong and narrow figure, broadeft at the bafe, and thence gradually decreafing, till it terminates in a point.

SUCCEDANEUM, in pharmacy, denotes a drug fubftituted in the place of another, in medical compofition.

SUCCESSION, *Succeffio*, in philofophy, an idea which we get by reflecting on that train of ideas conftantly following one another in our minds, when awake. See IDEA.

SUCCESSION, in law, implies a right to the whole effects left by a defunct.

SUCCESSOR, in law, one that fucceeds, or comes in the place of another.

It is held, that a fole corporation may take an eftate in fee to them and their fucceffors, but not without the word fucceffors: whereas an aggregate corporation may take a fee in fucceffion, without expreffing the word fucceffors; and likewife may have goods and chattles in fucceffion. See CORPORATION.

SUCCINUM, amber, in natural hiftory, which fee.

SUCCISA, in botany and pharmacy, a fpecies of fcabiofa, called by fome morfus diaboli, devil's bit; and faid to be alexipharmick, but is little ufed in the prefent practice.

SUCCORY, *Cichorium*, in botany, &c. which fee.

SUCCULA, in mechanicks, a bare axis, or cylinder, with ftaves to move it round; but without any tympanum or peritrochium.

SUCCULENT PLANTS, in botany, thofe whofe leaves are very thick and full of juice: fuch are the aloes, &c.

SUCKERS, in gardening, the fame with off-fets. See OFF-SETS.

SUCKING-PUMP. See PUMP.

SUCTION, *Suctio*, the act of fucking or drawing up a fluid, as air, water, milk, or the like, by means of the mouth and lungs.

SUDAMINA, little heat pimples in the fkin, like the millet-grains, frequent in youth, efpecially thofe of a hot temperament, and that ufe much exercife.

SUDATORY, *Sudatorium*, a name given by the ancient Romans to their hot or fweating-rooms; fometimes alfo called loconica. See BATH.

SUDOR, fweat, in phyfiology. See SWEAT.

SUDOR *Anglicanus*, the fweating ficknefs, a difeafe fo called from its appearing firft in England, in the year 1483, among the foldiers of Henry the feventh, when he landed at Milford-haven, in Wales, whence it fpread itfelf, and raged in London, from the 21ft of September to the end of October. In the fame city it returned five times, and always in the fummer; firft in 1485, then in 1506, afterwards in 1517, when it was fo violent as to take off the patient in three hours, and fo univerfal, as to attack people of all ages and conditions; fo that half of the inhabitants of feveral towns in England fell victims to its irrefiftible fury. It appeared the fourth time in 1548, when it generally proved mortal in fix hours; and then it appeared in 1549, at which time alone it fpread itfelf to the Netherlands and Germany, in the latter of which it proved very fatal. The laft return of it in London was in 1551, when it raged with fuch fury, as in one day to take off 120 of the inhabitants of Weftminfter.

For preventing this difeafe, temperance is ordered, and the choice of falutary aliments and drinks. No crude pot-herbs or fallads are to be ufed, becaufe they may have received a noxious quality from the air; or, if they are ufed, they are to be previoufly wafhed in warm water.

SUDORIFICK, in pharmacy, an appellation given to any medicine that caufes or promotes fweat.

Sudorifick, perfpirative, and alexipharmick medicines, fays Dr. Shaw, make a large part of the common difpenfatories. A few medicines well chofen, might fupply the place of all thefe; and of thefe, the principal one would prove to be camphor, which trial will always fhew to be greatly fuperior to bezoar, Gafcoign's powder, lapis contrayerva, and the like.

The fame gentleman gives the following eafy method of preparing a fafe and effectual fudorifick: Take an ounce of refined camphor, beat it in a marble mortar, with two ounces of blanched almonds, till it be reduced to a fmooth and even pafte. This may be formed into pills, or bolufes, and given, according to the ftrength of the patient, and other confiderations, from three grains to 40.

SUET, *Sevum*, or *Sebum*, in anatomy, the folid fat found in feveral animals, as fheep, oxen, &c. but not in the human fpecies.

SUFFOCATION, in medicine, the privation of refpiration, or breathing; which is fometimes occafioned by a congeftion of blood in the lungs, fo as to prevent the ingrefs of the air.

SUFFOCATION *of the Womb*, or *Matrix*, is a difeafe pretty frequent in women, called alfo fits of the mother. See HYSTERICK.

SUFFRAGAN, an appellation given to fimple bifhops, with refpect to archbifhops, on whom they depend, and to whom appeals lie from the bifhop's courts.

SUFFRAGE, *Suffragium*, denotes a vote given in an affembly, where fomething is deliberated on, or where a perfon is elected to an office or benefice.

SUFFRUTEX, among botanifts, denotes an underfhrub, or the loweft kind of woody plants, as lavender, rue, &c.

SUFFUSIO, in medicine, a cataract. See the article CATARACT.

SUGAR, *Saccharum*, a very fweet agreeable fubftance, extracted from a kind of canes, or reeds, growing in great plenty in both the E. and W. Indies.

Sugar is properly the effential falt of the fugar-cane, as tartar is of the grape. It is, while in its crude or unrefined ftate, a coarfe, fattifh, oleaginous matter, of a brownifh or greyifh colour, with a caft of a redifh or orange colour among it; and of a very fweet, but fomewhat difagreeable tafte. When it has been purified and refined by frequent folutions, and by other means, it becomes of a pure, bright, white, gloffy, and cryftalline colour, confiderably hard, and of a much pleafanter, though lefs intenfely fweet tafte. The plant which produces it, is one of the triandria digynia of Linnæus, and one

one of the herbæ graminifoliæ of Ray. It is deſcribed by Piſo under the name of viba and tachomura; by Cæſalpinus, under the name of canna millea; and by others, under that of arundo ſaccharifera, and calamus ſaccharinus. See SACCHARUM, SATURNI.

SUGAR *Mill.* This machine is compoſed of three rollers of an equal ſize, and equally armed with plates of iron, where the canes are to paſs. The roller in the middle is raiſed much higher than the reſt, that the two poles which are fixed croſs-ways at the top, and to which the beaſts are yoked, may turn about freely, without being hindered by the machine. The great roller in the middle is ſurrounded with a cog full of teeth, which bite upon the ſides of the two other rollers adjoining to it, by which means they are turned round, and by their motion grind and bruiſe the canes, which paſs quite round the great roller and come out dry, and ſqueezed from all their juice.

SUGILLATION, in medicine, an extravaſation of blood in the coats of the eye, which at firſt appears of a rediſh colour, and afterwards livid or black. If the diſorder is great, bleeding and purging are proper, as are diſcutients. The following cataplaſm is ſaid to be very good: Take of comfrey-root, ſix ounces; of Solomon's ſeal, two ounces; of elder flowers, one ounce and a half; of bean flour, one ounce; let all theſe be boiled in a ſufficient quantity of ſpring water. The decoction may be uſed as a fotus, and the ingredient for a cataplaſm.

SUIT, in law, is uſed in different ſenſes, as, 1. For an action, whether perſonal or real. 2. Suit of court, or ſuit-ſervice, which is an attendance the tenant owes to his lord's court. 3. Suit-covenant, where a perſon has covenanted to do ſervice to the court of the lords. 4. Suit-cuſtom, which is where one and his anceſtors have owed ſuit time out of mind. 5. It is uſed for a petition to the king, or any perſon of dignity; where a lord diſtrains his tenant for ſuit, and none is due; in this caſe, the party may have an attachment againſt him to appear in the king's court. 6. Suit of the king's peace, is an action brought againſt a perſon for breach of the king's peace; as in the caſe of treaſons, felonies, or treſpaſſes.

SULPHUR, in natural hiſtory, a fat, unctuous ſort of mineral ſubſtance, fuſible and inflammable by fire, and not diſſoluble or miſcible in water.

The ſulphur or brimſtone uſed in the ſhops is of two kinds, the one called native, the other factitious; the former being found naturally pure in the earth, the latter having been lodged in other bodies, and from thence ſeparated by means of fire into the form in which we meet with it.

Theſe two kinds, however, when genuine and pure, are wholly the ſame in every reſpect. Their characters are, that they are dry, ſolid, friable bodies, melting with a ſmall heat; inflammable, and, when fired in the open air, burning almoſt wholly away with a blue flame, and a noxious vapour; endued with an electrick power; and not diſſolved in acid menſtruums.

The factitious ſulphur is much the moſt common in the ſhops. It is ſometimes met with in very large maſſes, and called ſulphur in the cake; but what we moſt frequently ſee of it is in oblong cylindrick rolls of a yellow colour, ſometimes with, and ſometimes without an admixture of greeniſh. The yellow contains leſs, the greeniſh more of the vitriolick ſalt mixed with it; it is friable, and affords a ſort of cracking noiſe, when rubbed between the fingers; it is very eaſily reduced to powder, and melts with a ſmall degree of heat. It may be totally ſublimed, in a cloſe veſſel, without alteration. It takes fire on being brought into contact with a burning coal, or any ignated matter; and when pure and genuine, for we are liable to great cheats in regard to it, it does not burn away very quick, but continues a conſiderable time, emitting a deep blue flame. It is to be choſen for internal uſe of the pureſt and brighteſt yellow, light, eaſily broken, and appearing very bright and gloſſy where it breaks. If it be for making oil of ſulphur, the greeniſh rolls are the beſt, as containing moſt acid.

This kind of ſulphur is ſeparated, by means of fire, from various minerals, which are found naturally to contain it. The greateſt part of what we have, is made from the common vitriolick pyrites, the ſame mineral yielding both ſulphur and vitriol, and often allum. The firſt give it a degree of fire ſufficient to melt the ſulphur it contains, and, when this is all run out into veſſels prepared to receive it, they expoſe the remaining matter to the air, after which they boil it in water, and obtain from the lixivium the common green vitriol or copperas; and after all this is obtained, by adding an alkili to the ſame liquor, they get allum from it. In ſome places they work an argillaceous earth for ſulphur; this is uſually of a whitiſh colour, variegated with veins of red, and of a duſky blue. From this they ſeparate large quantities of common brimſtone, only, by fuſion, in cloſe veſſels luted together, and that which contains the ore placed in an inclining poſture; ſo that as ſoon as the ſulphur melts, it muſt run into the other veſſel, which ſerves as a receiver, and which is generally filled in part with water.

Theſe bodies have ſometimes the form of cucurbits or long necks, and ſometimes of retorts; and the proceſs is vulgarly called diſtillation, but it by no means agrees with what we uſually underſtand by that word. The ſulphur is never raiſed in vapour, but in all thoſe caſes is barely fuſed, and the veſſels are ſo placed that any thing liquid in the one muſt run into the other. Sulphur is ſeldom produced pure by the firſt operation, but is afterwards purified by repeated fuſions; ſome of the heterogeneous matter is brought over with it, ſeparating to the bottom, and others floating to the ſurface; it is ſeparated from the lighter by ſkimming them off, and from the heavier by pouring it carefully from its ſediment; when thus rendered ſufficiently pure, it is caſt into iron cylindrick moulds, greaſed on the inſide with linſeed oil, to prevent its ſticking to them, and is thus formed into the rolls we meet with it in.

This is the hiſtory of the common factitious yellow ſulphur; we might indeed vaſtly increaſe the number of its ores, ſince there are multitudes of other foſſils, in which true genuine ſulphur is contained, but we have given only thoſe which are worth the working for it.

The other, or native ſulphur is of four kinds, extremely different, in colour from each other, and ſome of them containing particles of other ſubſtances, and thoſe often of a very wrong kind for medicinal purpoſes among them. The four kinds of native ſulphur are, 1. The yellow which is very pellucid, and is the beſt of all for medicine, being perfect pure brimſtone. 2. The greeniſh, which is more opake, and contains a large portion of vitriol. 3. The grey, which is foul and earthy; and, 4. The red ſulphur, which is very beautiful, being perfectly pellucid and of a fine colour, but which is the laſt of any to be received into the ſhops, as it always contains ſome arſenick in it.

The firſt kind, or native yellow ſulphur, is what ought to be ſold in the ſhops under the name of ſulphur vivum. It is tranſparent as the fineſt amber, and is found in maſſes, from the ſize of a pea to that of four or five ounces weight. A native ſulphur equally pure with this is alſo found in form of powder, reſembling the common flower of brimſtone, incruſting the ſides and covers of ſulphureous ſprings, as thoſe of Aix la Chapelle; and it is ſometimes alſo found in form of iſicles or ſtalactites, hanging from the rocks among the burning mountains; in this caſe its figure ſeems in ſome degree owing to the fire. In its pureſt ſolid maſſes, it is found in the gold mines of Peru, and in ſome of the Hungarian and German ones. This is the ſame ſulphur, whether found in form of ſtalactites, of powder, or of theſe ſolid and tranſparent nodules; and this is the only kind which people ought to buy who take native ſulphur internally, without any farther preparation than powdering.

The hard greeniſh ſulphur is that called by ſome bezoardick ſulphur, from its being ſometimes found concreted round nuclei in form of the bezoars. It is more firm and ſolid than the yellow, and is ſcarce at all tranſparent. The yellow kind, when accidentally tinged with green, as it ſometimes is, ought to be rejected from internal uſe, much more this; but this is excellent for making the oil or acid of ſulphur. This is principally found among the burning mountains, particularly about Veſuvius.

The third, or grey kind, is a very poor and coarſe ſulphur, but is what we uſually meet with under the name of ſulphur vivum in the ſhops. It does not melt clear and ſmooth like the pure ſulphurs, but boils and bubbles; and, after burning, leaves a large remainder. This very little deſerves the place it holds in our ſhops, being much more properly treated in Italy as an ore of ſulphur, and worked

worked for it in the manner of the earths we have defcribed, and common yellow roll brimftone is made from it. It is found in vaft abundance, about the burning mountains, and in many other places, particularly at Sulfatara, where it is of the number of the ores worked in the common way.

The fine red fulphur is infinitely the moft beautiful of all the kinds. It is as tranfparent and as bright as a gem. It melts more flowly than any of the other kinds, and, when in fufion, fends out a very difagreeable fmell, like that of garlick, befide the common fulphureous vapour. This is a proof of its containing arfenick, from which alfo it probably has its colour. It is found principally in the gold mines, and is fuppofed to contain fome particles of that metal, but feveral trials have been made in vain to feparate gold from it.

Of thefe feveral kinds of fulphur, the common roll brimftone, and the pure native yellow kind, are the only ones proper for internal ufe in their crude ftate; but the flower of brimftone faithfully prepared is, perhaps, preferable to thefe. We know that fulphur rifes unaltered in fublimation, and, confequently, that we have it in its true ftate in the flowers; and we are more fafe this way than any other, from taking any thing we did not intend to take with it.

Sulphur, under which ever of thefe forms it appears, is ftill the fame in all its characters. It diffolves in oils, and in alkaline fubftances. It grows red when melted, but becomes yellow again when it cools. It affords an acid, the fame with that of vitriol, if its fumes in burning be catched in a proper manner; but it will not yield this acid by the common way of diftillation, but, inftead of feparating into its principles, rifes altogether to the head of the veffel, in form of flowers.

Sulphur melted with gold, provided that metal be pure, makes no fort of alteration in it; but this is the only metal that efcapes its effects. Thrown upon filver heated red-hot, the metal immediately melts; and, if taken from the fire as foon as it does fo, it will be found, when cold, to refemble lead rather than what it really is. It retains its malleability perfectly, and cuts eafily with a knife; but it is of a dull bluifh colour. It is eafily reduced to its proper appearance again however; for there requires no more to this, than the keeping it a few minutes in a ftrong fire to burn away the fulphur. If the heat is flackened towards the end of this fufion, the filver will not form into one uniform mafs, but will rife up in fmall fprigs all over the furface in a very beautiful manner, refembling the branches of filver fometimes feen on the furface of ores. Tin melted with brimftone, if the metal be firft granulated, and the brimftone added in powder in three times its quantity, deflagrates as if nitre had been mixed with it. The remainder becomes folid, while yet in the fire, and, when cold, is a brittle regulus of the colour of lead, and greatly refembling a femi-metal in its qualities. Tin may indeed be wholly turned into fcoria by burning it with additional parcels of fulphur. Sulphur melted along with lead deftroys its malleability, as much as it does that of tin. It becomes hard and rigid, and very difficult of fufion, and lofes the appearance of lead, being, in the regulus thus obtained, compofed of broad, bright, and glittering particles. Copper melts immediately upon being made red-hot, if brimftone be added to it; and becomes a black friable fubftance. Iron of all other metals melts the moft freely and readily with the fulphur, but it does not freely part with it again. A red-hot iron applied to a roll of fulphur, immediately throws off particles diffolved by the fulphur into a fpongy fcoria. Regulus of antimony melted with fulphur returns to common crude antimony again. Bizmuth melted with it affumes the appearance of antimony, and inftead of broad flakes is found to be compofed of needles or ftriæ running acrofs one another. Zinck fuffers lefs change from it, and mixes indeed lefs eafily with it; it at length becomes darker-coloured, and more brittle.

The chymifts have told us various ways of making fulphur by art, that it fhall be wholly like the native; and nothing is more certain than that it may be done. The vitriolick acid and an inflammable oil, properly combined, will always afford it. If four parts oil of turpentine and one part oil of vitriol be mixed together in a retort, and, after ftanding to digeft together a week or more, a fire be given under it, and a large receiver well luted on, a peculiar oily matter will come over into the receiver, true fulphur will be fublimed into the neck of the retort, and the remaining matter in the bottom of it will be formed into a kind of bitumen.

We may fee by this how nearly fulphur, vitriol, and the common bitumens are allied to one another, and what fort of proceffes nature ufes in the producing them. The ancients, as far back as we have any accounts of them, feem to have been always acquainted with fulphur. The Greeks called it theion holy, and ufed it in their facrifices and expiations. The Arabians mention it under the name of kabrick or chibur. It is of great ufe in medicine in its crude ftate, and affords us many valuable medicines in its feveral preparations. It is alfo of great ufe in many of the arts. Gun-powder owes its power in a great meafure to it. Its fumes check and prevent fermentation, for which reafon it is much ufed by our wine-coopers; and they bleach and whiten ftuffs by means of them.

In medicine, it is, in its crude ftate, given with great fuccefs in difeafes of the lungs. It ftrengthens and cleanfes them, and promotes expectoration, and has at all times been famous for its virtues againft cutaneous difeafes. It generally proves a little loofening to the bowels, and increafes the difcharges by perfpiration; it even communicates its fmell to the perfpired matter for a confiderable time after taking it, and will often blacken gold or filver that is worn by people who take any confiderable quantity of it.

The preparations of fulphur, in moft frequent ufe in the fhops, are thefe: 1. Flores fulphuris, flower of brimftone. 2. The fulphur præcipitatum, or precipitated fulphur, commonly called lac fulphuris. 3. The balfamum fulphuris, balfam of fulphur. 4. The aqua fulphurata, or fulphurated water. 5. The fpiritus fulphuris, the fpirit or oil of fulphur.

Flowers of SULPHUR. *Flores Sulphuris.* Take fix ounces of common fulphur, put it into a cucurbit, adept a capacious head, and, having luted the junctures, place it in a fand furnace, fo that the fand may almoft touch the lower rim of the glafs-head: let the pipe of the head, and alfo the body itfelf, incline a little downwards, that the moifture may run into the receiver fixed for that purpofe; make a gradual fire, and contrive it till the head begins to grow dark with the afcending flowers; continue the fire cautioufly that the head may not melt the flowers, and yet be ftrong enough to fublime the fulphur which will be elevated into the head, in a yellow, light, rarified, foft, powdery fubftance, called flowers of fulphur.

Thofe who make flowers of fulphur for fale, have entire furnaces built for that purpofe. See CHYMICAL *Laboratory*. It is a good pectoral medicine; its dofe is from 10 grains to a fcruple.

Precipitated SULPHUR, commonly called *Milk of* SULPHUR. Take flowers of fulphur one pound, of quick lime frefh made, and not ftony, three pounds; put thefe into two gallons of fair water, and boil the whole till the fulphur is diffolved: filtre the folution through paper, and add to it, by a few drops at a time, weak fpirits of vitriol till it become turbid, and in fine it will precipitate a white powder to the bottom of the veffel; pour off the water, and add frefh feveral times till the powder, after thefe repeated wafhings, becomes quite infipid. This is good in all the cafes in which the fulphur in fubftance, or its flowers, are ufed. Its dofe is from 10 grains to two fcruples.

Simple Balfam of SULPHUR. Take flowers of fulphur four ounces, pure oil of olives one pound, fet them over the fire in an earthen veffel; as the oil grows hot, the fulphur will melt in it, and will fall to the bottom in form of a red fhining fluid. After this, the fire is to be increafed gradually, till the whole body of the fulphur diffolves and blends with the oil into a thick opaque liquor; great care is to be taken not to fet the matter on fire, and the veffel is to be lightly covered, but the lid, or whatever elfe is put over it, is not to be faftened down. Balfam of fulphur may be made by the fame procefs with oil of turpentine, or any other of the vegetable effential oils, and with Barbadoes tar; but caution is to be ufed in making the former of thefe balfams, that the veffels be not too clofely fhut, nor the fire too violently increafed. Balfam of fulphur made with oil

of

of turpentine will explode under these circumstances with a force greatly superior to that of gun-powder.

Spirit or Oil of SULPHUR. This acid is wholly the same with that of vitriol, and, therefore, it is scarce worth any body's while to make it in the common way, it being one of the most troublesome processes in chymistry. The vapour of burning sulphur, retained by any means, furnishes this acid: the usual way has been to support a glass bell moistened on the inside over a pan of burning brimstone, and to catch the drops collected on its inner surface in a receiver, the running of which is to be favoured by the bell's being a little inclined towards the side where it is placed. This spirit is an agreeable acid, and is very good in every case in which the spirit of vitriol is.

SULPHURATED *Water*. Take common water one quart, of pure sulphur half a pound, set a part of the sulphur on fire in an iron ladle, and suspend it in that state over the water in a close vessel; let the remainder of the sulphur be afterwards fired and suspended in the same manner, and when the operation is over, the water will have acquired a sharp acid taste, and is to be reserved for use. The most commodious vessel for making this is a large glass receiver fitted with a wooden plug, into which the handle of the ladle may be fixed; as soon as the sulphur is fired, the ladle is to be thrust so far into the receiver, that the plug may come to stop the aperture, and the covering the mouth over this with a wet cloth will be sufficient to keep in the fumes. This is the liquor called by some authors, gas sulphuris; it is an agreeable acid, and is good in malignant and petechial fevers, given in the common drink. It quenches thirst, and cools the mouth and tongue.

SULTAN, or SOLDAN, a title or appellation given to the emperor of the Turks.

SULTANA, the wife or consort of a sultan. The favourite sultana is called Hhaseki-sultana, i. e. private sultana.

SUM, *Summa*, in arithmetick, &c. signifies the quantity that arises from the addition of two or more magnitudes, numbers, or quantities together.

SUM *of an Equation*, is when, the absolute number being brought over to the other side with a contrary sign, the whole becomes equal to o: this Des Cartes calls the sum of the equation proposed.

SUMACH, a drug used in dying, as also in the preparation of black Morocco, and other leather.

SUMMARY, an abridgement containing the sum and substance of a thing in a few words.

SUMMATORIUS CALCULUS, the method of summing differential quantities; that is, from any differential given, to find the quantity from whose differencing the given differential results. This method we more usually call the inverse method of fluxions, and foreigners integralis calculus.

SUMMER, one of the seasons of the year, commencing in these northern regions on the day the sun enters Cancer. Or, more strictly and universally, the summer begins on the day when the sun's meridian distance from the zenith is the least. It ends on the day when his distance is a mean betwixt the greatest and smallest. The end of summer coincides with the beginning of winter.

SUMMER, in architecture, is a large stone, the first that is laid over columns and pilasters, in beginning to make a cross vault; or it is the stone which, being laid over a piedroit or column, is hollowed to receive the first haunce of a platband.

SUMMER, in carpentry, is a large piece of timber which being supported on two stone piers, or posts, serves as a lintel to a door, window, &c.

SUMMONS, *Summonitio*, in law, a citing or calling a person to any court to answer a complaint, or even to give in his evidence, &c.

SUMPTUARY LAWS, *Leges sumptuariæ*, are laws made to restrain excess in apparel, costly furniture, eating, &c.

SUN, *Sol*, in astronomy, the great luminary which enlightens the world, and, by his presence, constitutes day. Sir Isaac Newton, in his Principia, proves that the matter of the sun to that of Jupiter is nearly as 1100 to 1; and that the distance of that planet from the sun is in the same ratio to the sun's semidiameter. That the matter of the sun to that of Saturn is as 2360 to 1; and the distance of Saturn from the sun is in a ratio but a little less than to the sun's semidiameter. And consequently that the common centre of gravity, of the sun and Jupiter, is nearly in the superficies of the sun; of Saturn and the sun, a little within it. And by the same manner of calculation it will be found that the common centre of gravity of all the planets cannot be more than the length of the solar diameter distant from the centre of the sun: this common centre of gravity he proves to be at rest; and therefore, though the sun, by reason of the various position of the planets, may be moved every way, yet it cannot recede far from the common centre of gravity. And this, he thinks, ought to be accounted the centre of our world. By means of the solar spots it hath been discovered, that the sun revolves round his own axis, without moving (considerably) out of his place, in about 25 days. And that the axis of this motion is inclined to the ecliptick, in an angle of 87° 30′ nearly.

The sun's apparent diameter being sensibly shorter in December than in June, as is plain and agreed from observation, the sun must be proportionably nearer to the earth in winter than in summer; in the former of which seasons will be the perihelion, in the latter the aphelion: and this is also confirmed by the earth's moving swifter in December than it doth in June. For since, as Sir Isaac Newton has demonstrated by a line drawn to the sun, the earth always describes equal areas in equal times, whenever it moves swifter, it must needs be nearer to the sun. And for this reason there are about eight days more from the sun's vernal equinox to the autumnal, than from the autumnal to the vernal.

According to Mr. Cassini, the sun's greatest distance from the earth is 22374, his mean distance 2200, and his least distance 8022 semidiameters of the earth. And that the sun's diameter is equal to 100 diameters of the earth, and therefore the body of the sun must be 1000000 times greater than that of the earth.

Mr. Azout assures us, that he observed by a very exact method the sun's diameter to be not less than 31′ 45″, in his apogee, and not greater than 32′ 45″, in his perigee. The mean apparent diameter of the sun, according to Sir Isaac Newton, is 32′ 12″; in his theory of the moon, 32′ 15″. If you divide 360° (i. e. the whole ecliptick) by the quantity of the solar year, it will quote 59′ 8″, &c. which therefore is the quantity of the sun's diurnal motion. And, if this 59′ 8″ be divided by 24, you have the sun's horary motion, which is 2′ 28″; and, if you will divide this last by 60, you will have this motion in a minute, &c. And this way are the tables of the sun's mean motion, which you have in the books of astronomical calculation constructed. The sun's horizontal parallax Dr. Gregory and Sir Isaac Newton make but 10″. To find this angle, astronomers have attempted variety of methods, but have as yet found none that will determine it exactly; however, by many repeated observations of Dr. Halley, it is found to be not greater than 12″, nor less than 9″. Wherefore $10\frac{1}{2}$″ (the mean) has been fixed upon as near the truth.

Sir Isaac Newton, in his Opticks, gives good reasons to suppose the sun and fixed stars to be great earths vehemently hot; whose heat is conserved by the greatness of their bodies, and the mutual action and re-action between them and the light which they emit; and whose parts are kept from fuming away, not only by their fixity, but also by the vast weight and density of the atmospheres incumbent on them, and every way strongly compressing them, and condensing the vapours and exhalations which arise from them. The light seems to be emitted from the sun and fixed stars (which probably are suns to other systems) much after the manner as iron, when heated to such a degree as to be just going into fusion by the vibrating motion of its parts, emits, with force and violence, copious streams of liquid fire all around. Great bodies must preserve their heat longest, and that, perhaps, in the proportion of their diameters.

Sir Isaac Newton hath made it probable, that the great comet in the year 1680, in its perihelion, would not entirely go off in 50000 years. Whence we may guess, that if the sun and fixed stars be only collections of dense and solid matter, like the planets, but heated to a very intense degree, they may be many millions of years without losing any considerable part of their heat.

SUN-

SUN-FLOWER, the name of a well-known flower, much cultivated in large gardens. The ſun-flower is an annual plant, and the ſeeds ſhould be ſown every ſpring in a bed of good light earth. When the ſhoots are about three inches high, they ſhould be tranſplanted into nurſery beds, and ſet at eight inches diſtance every way; they ſhould remain there till they are a foot high, and then be carefully taken up with a ball of earth at their roots, and planted in large borders, or intermixed with flowering ſhrubs, and other large plants; they muſt be frequently watered till they have taken root, after which they require no other care. The flowers appear in July, and ſtand a conſiderable time: the largeſt of them ſhould be preſerved for ſeed. The birds are very fond of the ſeed of the ſun-flower, and muſt therefore be carefully guarded from them, and the head left on the plant till October, at which time it ſhould be cut off, and hung up to dry in an airy place, and in a month more the ſeeds will be perfectly hardened.

SUN-SCORCHED, a term uſed in ſome parts of England to expreſs a diſtemperature of fruit-trees, owing to the ſun's affecting them too forcibly on a ſudden; the conſequence of which is the loſs and withering of the fruit. Such trees only are ſubject to this, as are planted in places ſheltered from the ſpring ſun, and open to that of the ſummer; and may be always cured by proper waterings.

SUNDAY, or the LORD'S-DAY, a ſolemn feſtival obſerved by Chriſtians on the firſt day of every week, in memory of our Saviour's reſurrection. This is the principal and moſt noted of the Chriſtian feſtivals, and was obſerved with great veneration in the ancient church, from the time of the apoſtles, who themſelves are often ſaid to have met on that day for divine ſervice. It is likewiſe called the ſabbath-day, as being ſubſtituted in the room of the Jewiſh ſabbath. See SABBATH.

The ancients retained the name Sunday, or die ſolis, in compliance with the ordinary forms of ſpeech, the firſt day of the week being ſo called by the Romans, becauſe it was dedicated to the worſhip of the Sun.

Beſides that the moſt ſolemn parts of the Chriſtian worſhip were always performed on Sundays, this day was diſtinguiſhed by a peculiar reverence and reſpect expreſſed towards it in the obſervation of ſome ſpecial laws and cuſtoms. Among theſe, we may reckon, in the firſt place, thoſe imperial laws which ſuſpended all proceedings at law upon this day, excepting only ſuch as were of abſolute neceſſity, or eminent charity; ſuch as the manumiſſion of ſlaves, and the like. Neither was it only the buſineſs of the law, but all ſecular and ſervile employments were ſuperſeded upon this day, ſtill excepting acts of neceſſity and mercy.

Another thing which the Chriſtian laws took care of, to ſecure the honour and dignity of the Lord's-day, was, that no ludicrous ſports or games ſhould be followed on this day; but all ſuch recreations and refreſhments as tended to the preſervation or conveniency of life were allowed of; and therefore, Sunday was always a day of feaſting, and it was not allowable to faſt thereon, not even in Lent.

The great care and concern of the primitive Chriſtians in the religious obſervation of the Lord's-day, appears, Firſt, from their conſtant attendance upon all the ſolemnities of publick worſhip, from which nothing but ſickneſs, impriſonment, baniſhment, or ſome great neceſſity, could detain them.

Secondly, from their zeal in frequenting religious aſſemblies on this day, even in times of the hotteſt perſecution, when they were often beſet and ſeized in their meetings and congregations.

Thirdly, from their ſtudious obſervations of their vigils, or nocturnal aſſemblies, that preceded the Lord's-day.

Fourthly, from their eager attendance on ſermons, in many places, twice upon this day, and their conſtant reſorting to evening prayers, where there was no ſermon.

Laſtly, from the ſevere cenſures inflicted on thoſe who violated the laws concerning the religious obſervation of this day, ſuch perſons being uſually puniſhed with excommunication; as appears from the apoſtolical conſtitutions, and the canons of ſeveral councils.

In the Romiſh breviary, and other offices, we meet with a diſtinction of Sundays, into thoſe of the firſt and ſecond claſs: Sundays of the firſt claſs, are, Palm-Sunday, Eaſter-Sunday, Advent-Sunday, Whit-Sunday, &c. thoſe of the ſecond claſs are the common Sundays of the year.

By our laws, no perſon is to do any worldly labour on this day, which is ſet apart for the ſervice of God, except works of neceſſity and charity, under the penalty of 5*s*. And if any perſon cry, or expoſe to ſale, any wares or goods on a Sunday, the ſame will be forfeited to the poor, &c. the offender being convicted thereof before a juſtice of the peace, who is authoriſed to cauſe the penalties and forfeitures to be levied by diſtreſs. Yet this extends not to dreſſing of meat, nor to the crying or ſelling of milk in the morning or evening, or the ſelling of mackerel on that day.

The Sunday is not a day in law, ſo that no proceſs lies, or may be ſerved thereon, except for treaſon, or felony, or an eſcape. A ſale of goods, or contract made on a Sunday, is deemed void.

SUNDAY-LETTER. See DOMINICAL-*Letter*.

SUPERCARGO, a perſon employed by merchants to go a voyage, and overſee their cargo, or lading, and diſpoſe of it to the beſt advantage.

SUPERCILIUM, in anatomy, the eye-brow. See EYE.

SUPERCILIUM, in the ancient architecture, the uppermoſt member of the corniche, called by the moderns corona, crown, or larmier.

SUPEREROGATION, in theology, what a man does beyond his duty, or more than he was commanded to do. The Romaniſts ſtand up ſtrenuouſly for works of ſupererogation, and maintain, that the obſervance of evangelical councils is ſuch. By means hereof, a ſtock of merit is laid up, which the church has the diſpoſal of, and which ſhe diſtributes in indulgencies to ſuch as need. The reformed church does not allow of any work of ſupererogation.

SUPERFETATION, *Superfœtatio*, in medicine, a ſecond, or after conception, happening, when the mother, already pregnant, conceives of a later coition; ſo that ſhe bears at once two fœtuſes of unequal age and bulk, and is delivered of them at different times.

SUPERFICIES, or SURFACE, in geometry, a magnitude conſidered as having two dimenſions; or extended in length and breadth, but without thickneſs or depth. In bodies, the ſuperficies is all that preſents itſelf to the eye. A ſuperficies is chiefly conſidered as the external part of a ſolid. When we ſpeak of a ſurface ſimply, and without any regard to body, we uſually call it figure. The ſeveral kinds of ſuperficies are as follow. Rectilinear ſuperficies, that comprehended between right lines; curvilinear ſuperficies, that comprehended between curve lines; plane ſuperficies, is that which has no inequality, but lies evenly between its boundary lines; convex ſuperficies, is the exterior part of a ſpherical, or ſpheroidical body; and a concave ſuperficies, is the internal part of an orbicular or ſpheroidical body.

The meaſure or quantity of a ſuperficies, or ſurface, is called the area thereof. The finding of this meaſure, or area, is called the quadrature thereof. To meaſure the ſurfaces of the ſeveral kinds of bodies, as ſpheres, cubes, parallelepipeds, pyramids, priſms, cones, &c. ſee SPHERE, &c.

SUPERFINE, in the manufactories, a term uſed to expreſs the ſuperlative fineneſs of a ſtuff; thus a cloth, a camblet, &c. are ſaid to be ſuperfine, when made of the fineſt wool, &c. or when they are the fineſt that can be made. The term is particularly uſed among gold or ſilver wire-drawers, for the gold or ſilver wire, which, after being drawn through an infinite number of holes, each leſs and leſs, is at length brought to be no bigger than an hair.

SUPERINSTITUTION, *Superinſtitutio*, denotes an inſtitution upon another, as where A B is admitted and inſtituted to a benefice upon one title, and C D is admitted and inſtituted on that of another.

SUPERINTENDANT, in the French cuſtoms, an officer who has the prime management and direction of the finances or revenues of the king. The term is alſo uſed for the firſt officer of the queen's houſhold, who has the chief adminiſtration thereof. They have alſo a ſuperintendant of the buildings, anſwering to the ſurveyor of the works among us.

SUPERINTENDANT alſo denotes an eccleſiaſtical ſuperior

perior in feveral reformed churches, where epifcopacy is not admitted, particularly among the Lutherans in Germany, and the Calvinifts in fome other places. The fuperintendant is in effect little other than a bifhop, only his power is fomewhat more reftrained than that of the diocefan bifhops. He is the chief paftor, and has the direction of all the inferior paftors within his diftrict or diocefe.

SUPERIOR, or SUPERIOUR, fomething raifed above another, or that has a right to command another.

SUPERJURARE, was anciently a term ufed in our law, where a criminal endeavoured to excufe himfelf by his own oath, or by the oath of one or two witneffes; and the crime charged againft him fo notorious, that he was convicted upon the oaths of many more witneffes: this was termed fuperjurare.

SUPERLATIVE, in grammar, one of the three degrees of comparifon, being that inflection of nouns-adjective that ferves to augment and heighten their fignification, and fhews the quality of the thing denoted to be in the higheft degree. In Englifh, the fuperlative is ufually formed by the addition of *eft* to the pofitive, as richeft, greateft, &c. and frequently by prefixing of *moft*, as moft rich, moft great, &c.

SUPERNUMERARY, fomething over and above a fixed number. In feveral of the offices are fupernumerary clerks, to be ready on extraordinary occafions. There are alfo fupernumerary furveyors of the excife, to be ready to fupply vacancies when they fall; thefe have but half pay. In mufick, the fupernumerary, called by the Greeks proflambanomenos, is the loweft of the chords of their fyftem, anfwering to a, mi, la, of the loweft octave of the moderns.

SUPERONERATIONE PASTURÆ, in law, a judicial writ which lies againft a perfon that is impleaded in the county-court for furcharging of a common with his cattle, in a cafe where he was formerly impleaded for it in the fame court, and the caufe is removed to one of the courts of Weftminfter.

SUPER-PURGATION, *Hypercathrofis*, in medicine, an exceffive over-violent purging, the ufual effects of colliquating, corrofive and ftimulating medicines. In the beginning of this diforder, a very thin matter is evacuated: but afterwards, when the relaxation and aperture of the veffels are increafed, the neceffary humours are difcharged; there is firft an excretion of yellow bile, then of phlegm, then of black bile, and laft of all, blood.

Thofe who labour under a fuper-purgation, muft be treated with frictions of the fkin, and a warm bath; drinking, before they bathe, thin, red, or yellow wine, for fuch is eafieft of diftribution, with fops of bread, and pomegranates. If the evacuation continues, let the limbs be bound in fuch a manner, that the bandage may be carried from the upper to the lower parts. Exhibit alfo a fmall quantity of theriaca, to be taken with the flefh of vipers; or, for want of that, troches of theriaca, or troches of feeds, and of the antidote called philonium. Cupping-glaffes may alfo be applied to the ftomach, and cataplafms of polenta and mulfum; after which, you may ufe aftringent epithems, but the greateft relief is had from frictions of the whole body, and potable remedies. The patient fhould keep himfelf from cold air, or what is very warm. If the evacuation ftill continues, the aforefaid cataplafms fhould be applied, and obtundents injected in clyfters, fuch as fat of geefe, fweet wine, oil of fpike, and the like.

SUPERSCAPULARIS INFERIOR, in anatomy, the fame with infrafpinatus.

SUPERSCAPULARIS SUPERIOR, is the fame with fuprafpinatus. See SUPRASPINATUS.

SUPERSEDEAS, in law, according to Fitzherbert, is a writ which lies in divers cafes, and in general fignifies a command to ftay fome of the ordinary proceedings in law, which, on good caufe fhewn, ought not to proceed. It is likewife ufed for ftaying of an execution after a writ of error is allowed, and bail put in, but not before bail is given, in cafe there be a judgment upon verdict, or by default in debt, &c.

A fuperfedeas is alfo granted by the court for fetting afide an erroneous judicial procefs, &c. And a prifoner may be thereby difcharged upon entering his appearance, and on the plaintiff's not filing a declaration againft him. For this writ is as good a caufe to difcharge the perfon, as the firft procefs is to arreft him. There is a further writ of fuperfedeas, where an audita querela is fued, and in cafes of furety of the peace, when one is already bound to the peace in chancery, or elfewhere.

SUPER-STATUTO DE ARTICULIS CLERI, in law, a writ that lies againft the fheriff, or other officer, that diftrains in the king's highway, or in the lands anciently given to the church.

SUPER-STATUTO PACTO POUR SENESCHAL ET MARSHAL DE ROY, &c. a writ which lies againft the fteward or marfhal, for holding plea of freehold in his court, or for trefpafs, or contracts not made within the king's houfhold.

SUPER-STATUTO VERSUS SERVANTES ET LABORATORES, a writ lying againft a perfon who keeps another perfon's fervant departed from his fervice, contrary to law.

SUPERSTITION, extravagant devotion, or religion, wrong directed, or conducted.

SUPERVISOR, a furveyor or overfeer.

It was formerly, and ftill remains a cuftom among fome perfons, to appoint a fupervifor of a will, to fee that the executors thereof do punctually obferve and perform the fame.

Supervifor formerly was ufed for furveyor of the highways. There are likewife certain officers of the excife, who are called fupervifors, on account of their having the fupervifing and infpecting of the books, &c. of the inferior officers belonging to that branch of the revenue, to prevent their neglect of duty.

SUPINATION, in anatomy, the action of a fupinator-mufcle, or the motion whereby it turns the hand fo as that the palm is lifted up towards heaven.

SUPINATOR, in anatomy, a denomination given to two mufcles of the arm, the one called the fupinator longus, the other the fupinator brevis, both ferving to turn the palm of the hand upwards. The firft has its origin from the exterior fpine of the humerus, and its termination at the lower end of the radius; the fecond rifes from the upper part of the ulna, and is inferted into the upper part of the radius, which it totally furrounds and inclofes. This laft mufcle may alfo be of ufe in the bending of the cubit.

SUPINE, in Latin grammar, part of the conjugation of a verb, being a verbal fubftantive of the fingular number, and the fourth declenfion.

There are two kinds of fupines; one, called the firft fupine, ending in *um*, of the accufative cafe, is always of an active fignification, and marks a motion, as abiit deambulatum; the other called the laft fupine, and ending in *u*, of the ablative cafe, is of a paffive fignification, and is governed by fubftantives or adjectives, as facile dictu, &c.

SUPPLE, to fupple a horfe in the menage, is to make him bend his neck, fhoulders, and fides, and to render all the parts of his body more pliable.

SUPPLEMENT *of an Arch*, in geometry or trigonometry, is the number of degrees that it wants of being an intire femicircle; as a complement, fignifies what an arch wants of being a quadrant.

SUPPLEMENT, in matters of literature, an appendix to a book, to fupply what is wanting therein.

SUPPLICAVIT, in law, a writ that iffues out of the court of Chancery for taking furety of the peace, where a perfon is in danger of receiving fome bodily hurt from another. It is directed to the juftices of the peace and fheriff of the county, and is grounded on the ftatute 1 Edw. III. which appoints, that certain perfons fhall be appointed by the lord chancellor to take care of the peace. In order to fue out this writ, the party requiring it firft goes before one of the mafters in Chancery and makes oath, that he does not defire the fame out of any malice, but purely for his own fafety, and the fecurity of his perfon; upon which the mafter will make out a warrant, ordering the writ to be made out by one of the clerks of the fix clerk's office, after which the writ muft be delivered to the fheriff to have his warrant thereon for arrefting the party, &c.

SUPPORTED, in heraldry, a term applied to the uppermoft quarters of a fhield when divided into feveral quarters, thefe feeming, as it were, fupported or fuftained by thofe below. The chief is faid to be fupported when it is of two colours, and the upper colour takes up two thirds

thirds of it. In this cafe it is fupported by the colour underneath.

SUPPORTERS, in heraldry, figures in an atchievement placed by the fide of the fhield, and feeming to fupport or hold up the fame. Supporters are chiefly figures of beafts: figures of human creatures, for the like purpofe, are properly called tenants. Some make another difference between tenant and fupporter: when the fhield is borne by a fingle animal, it is called tenant; when by two, they are called fupporters. The figures of things inanimate fometimes placed afide of efcutcheons, but not touching or feeming to bear them, though fometimes called fupporters, are more properly cotifes.

The fupporters of the Britifh arms are a lion and an unicorn: thofe of the French arms are angels, &c. See Arms.

In England, none under the degree of a banneret are allowed fupporters, which are reftrained to thofe called the high nobility. The Germans permit none but princes and noblemen of rank to bear them: but among the French the ufe of them is more promifcuous.

SUPPOSITION, in mufick, the ufing two fucceffive notes of equal value as to time, one of which, being a difcord, fuppofes the other a concord.

The harmony, Mr. Malcolm obferves, is to be always full on the accented part of the meafure or bar, and void of difcords; yet here difcords, by proper refolution and preparation, are even neceffary on the accented part of the meafure. Difcords, by conjoint degrees, may pafs without much offence, and it is not there required that the harmony be fo complete as on the accented part. This tranfient ufe of difcords, followed by concords, makes what the French call fuppofition. There are feveral kinds of fuppofition. The firft is when the principal parts proceed gradually from concord to difcord, and from difcord to concord; the intervening difcord ferving only as a tranfition to the following concord. Another kind is when the parts do not proceed gradually from difcord to concord, but defcend to it by the interval of a third. A third kind, like the fecond, is when the rifing to the difcord is gradual, but the defcending from it to the following concord, is by the diftance of a fourth. A fourth kind, very different from all the reft, is when the difcord falls on the accented part of the meafure, and the rifing to it is by the interval of a fourth; in which cafe it is abfolutely neceffary to follow it immediately by a gradual defcent into a concord that has juft been heard before the harmony to make the preceding difcord pafs without offence, and only feem a tranfition to the concord.

SUPPOSITORY, *Suppofitorium*, in pharmacy, a kind of medicated cone, or ball, which is introduced to the anus, for opening the belly.

Suppofitories are ufually made of foap, fugar, alum, or a piece of tallow-candle, about the length of a man's thumb and the breadth of a finger, though they may be made fmaller for children, and fometimes a little thicker for adults.

Suppofitories are fometimes compounded of ingredients adapted to the difeafe and circumftances of the patient, as of honey, falt, powder of aloes, colocynthia, and the like. If one fuppofitory does not occafion a ftool, it muft be followed by another ftronger one; and if that does not fucceed, the repetition muft be continued till the effect required is produced. They are fometimes lubricated with oil or butter, that they may be introduced with greater eafe. Some ufe a lozenge of fugar, or a piece of thin linen cloth, rolled up with a little lard or falt-butter, which greatly loofens the belly.

For ulcers of the rectum, the beft fuppofitories are made of honey of rofes, powder of maftich and myrrh, or of colophony. The ftronger fuppofitories, which are compofed of acrid and ftimulating ingredients, are advantageoufly ufed in promoting a difficult birth, if the infant be in a natural pofition; and alfo for expelling the fecundines, when they are tenacioufly retained in the uterus. In exhibiting them, the patient fhould be put in the fame pofture as in giving a clyfter, and the fuppofitory muft be gently thruft up the anus with the finger.

SUPPRESSION, in law, the extinction or annihilation of an office, right, rent, or the like.

Suppression, in grammar and rhetorick, denotes an omiffion of certain words in a fentence, which yet are neceffary to full and perfect conftruction: as, "I came from my father's;" that is, "from my father's houfe."

Suppreffion is a figure of fpeech very frequent in our language, chiefly ufed for brevity and elegance. Some rules relating hereto are as follow: 1. Whenever a word comes to be repeated in a fentence oftener than once, it is to be fuppreffed: thus we fay, "This is my mafter's horfe;" not "this horfe is my mafter's horfe." 2. Words that are neceffarily fupplied may be fuppreffed. 3. All words that ufe and cuftom fupprefs in other languages, are alfo to be fuppreffed in Englifh, unlefs there be particular reafons for the contrary.

Suppreffion is alfo a figure in fpeech, whereby a perfon in rage, or other difturbance of mind, fpeaks not out all he means, but fuddenly breaks off his difcourfe; thus, the gentleman in Terence, extremely incenfed againft his adverfary, accofts him with this abrupt faying, "Thou of all." The excefs of his indignation and rage choaked the paffage of his voice, and would not fuffer him to utter the reft. But in thefe cafes, though the difcourfe is not complete, the meaning is readily underftood, and the evidence of the thought eafily fupplies the defect of words.

Suppreffion, fometimes, proceeds from modefty, and fear of uttering any word of ill, and offenfive found.

Suppression, in medicine, is generally ufed for a retenfion of urine or the menfes.

SUPPRESSIONIS Ignis, a fire of fuppreffion, a term ufed in chymiftry, to exprefs fuch an application of fire to any fubject that it fhall at once act upon it, both above and below, in the fame manner. The ufual way of giving this heat is by covering the veffel, in which the ingredients are put, with fand, and then laying hot coals upon that, fo that they may heat through the fand downwards.

SUPPURATION, in medicine and furgery, the fecond way wherein an inflammation terminates, being a converfion of the infpiffated blood and the foft adjacent parts, as the veffels and fat, into pus, or matter: which diforder, when it has not yet found an opening, is generally called an abfcefs.

The beft cure of an inflammation is by refolution or difperfion: but when this is out of the power of the furgeon or phyfician to effect, and when tumours and phlegmons fhew a tendency to fuppuration, all the refolving and difperfing medicines muft be laid afide, and great care muft be taken to forward the maturity of the inflammation; that is, to convert the ftagnated blood into laudable matter; then to give a difcharge, or vent, to this fuppurated matter; afterwards to cleanfe the part; and finally to incarn and heal it.

In general, fuppuration is to be promoted by fuch of the emollient medicines as obftruct the pores of the fkin, as fat, oils, and glutinous medicines; as alfo the fharp, pungent, and in fome degree, cauftick medicines, which may be ufed in form of cataplafms or plafters. But to be more particular, fuppurating medicines, befides thofe already enumerated under abfcefs, &c. are the fats of a goofe, of a dog, of a man, of a viper, and of a bear; pigeon and cow-dung; bran, yeaft, herrings, leeches, melilot, tobacco, oil, Burgundy pitch, common pitch, rofin, deer fuet, ox fuet, fheep fuet, and frankincenfe. Thefe medicines, either alone or compounded, are to be applied hot to the part, and the application frequently repeated, till the matter within is found to be fufficiently ripened by the foftnefs and whitenefs of the tumour: but when the abfcefs is fmall it is fufficient and more convenient to apply fome of the ripening plafters, as diachylon, with the gums, or the like, till the fuppuration is perfected.

A ripening cataplafm from the London difpenfatory, is as follows: Take of figs, four ounces; yellow bafilicum ointment, one ounce; galbanum ftrained, half an ounce: beat the figs thoroughly in a mortar, occafionally dropping in fome fpirit of wine, or ftrong ale; then carefully mix them with the ointment firft liquified along with the galbanum. And a ripening plafter from the Edinburgh difpenfatory is this: Take of gum plafter, an ounce and a half; Burgundy pitch, half an ounce: boil them together.

In general, it is to be obferved, that fuppurative medicines are fuch as by the activity and warmth of their parts, are able to penetrate the pores, and mix with and

rarify any obſtructed matter, ſo that it may be rendered fit to diſcharge, upon laying open the part by a cauſtick or inciſion.

Now, in many inſtances, as the matter by this means rarifies and grows more fluid, the refluent blood is apt to waſh it back into the common maſs, which ſometimes is of that nature as to do a great deal of miſchief; or by making it take up more room upon its rarefaction, occaſions it more to diſtend the parts in which it is contained, whereon a ſenſe of pain is excited, and thereby a greater concourſe of fluid, and conſequently a needleſs increaſe of the tumour; ſo that medicines under this denomination, require to be in the hand of ſuch as are ſo well acquainted with the mechaniſm of the animal œconomy, as to be able to apply them to the beſt advantage, and know how to avoid the hazards which may ariſe from their abuſe. Nor are internal remedies to be neglected, in order to further a ſuppuration, eſpecially when the tumour is large and of conſequence.

In theſe caſes, when the blood moves too ſlowly, which may be known by the pulſe, the patient muſt be allowed to eat meat, and muſt take ſuch medicines as are warm and ſtimulating, by means of which, and by the increaſed motion of the blood, the inſpiſſated particles contained in the ſmaller veſſels, will be the more eaſily converted into matter. Strong broths are very proper for this purpoſe, as alſo the uſe of wine, or ale, in moderation; and Venice treacle, diaſcordium, and the confection of alkermes, are to be the medicines taken three or four times a day, and medicated teas, made of founders-wood, ſaſſafras, or cinnamon. But on the contrary, when the motion of the blood is too violent, and the heat too great, cooling medicines are to be given, ſuch as the thin and watery drinks, the ſub-acid medicines, and nitre: bleeding in a ſmall quantity, is alſo often neceſſary in this caſe. But when the conſtitution is ſound, and the blood's motion regular, the uſe of internal medicines, to promote ſuppuration, is trifling, and may be altogether rejected. See Abscess, Tumour, Wound, &c.

SUPPURATIVES, or ſuppurating medicines, ſuch as promote ſuppuration. See the preceding article.

SUPPUTATION. See Computation.

SUPRACOSTALES, or *Levatores Coſtarum*, in anatomy, muſcles ſerving to reſpiration; being among thoſe that dilate the thorax for that end, and therefore reckoned among the dilatores. See Dilatores. The muſcles are of two kinds, being diſtinguiſhed from their figures into ſhort and long. The ſhort ones are 12 on each ſide; they have their origin from the tranſverſe proceſſes of eleven vertebræ of the back, and of one that is in the lower one of the neck, and they are inſerted into the hinder part of the ribs. The long ſupracoſtales are three or four: their origin is the ſame with the ſeventh, eighth, ninth, and tenth vertebræ, and their end in the ninth, tenth, eleventh, and twelfth ribs.

SUPRALAPSARIANS, in theology, thoſe who hold that God in the decree of election and preterition, did not conſider mankind either as fallen or unfallen; but choſe ſome, and rejected others, conſidered merely as beings that ſhould infallibly exiſt.—The *Sublapſarians* hold, that the elect were choſen, and the reprobate paſſed by, not merely as creatures; but, complexly, as ſinners. Each hypotheſis has been adopted by ſome of the beſt and greateſt men that ever lived. Calviniſm is the general name, under which, the partizans of both are comprehended. The church of England ſyſtem, is, ſtrictly ſpeaking, formed on the *ſublapſarian* principle: though with ſuch moderation as not to exclude the former.

SUPRASPINATUS, in anatomy, a muſcle thus called from its fleſhy origination at the upper end of the baſis of the ſcapula above the ſpine, to the upper part whereof it is connected, as alſo to the ſuperior edge of the ſcapula, whence marching along the upper interſcapulum, or thin part of the ſcapula, which it fills, it paſſes under the acromium and articulation of the humerus. It helps to lift the arm upwards.

SUPREMACY, in our polity, the ſuperiority or ſovereignty of the king over the church as well as ſtate, whereof he is eſtabliſhed head. See King.

The king's ſupremacy was at firſt eſtabliſhed, or, as others ſay, recovered, by king Henry VIII. in 1534, after breaking with the pope. It is ſince confirmed by ſeveral canons, as well as by the articles of the church, and is paſſed into an oath which is required as a neceſſary qualification for all offices and employments both in church and ſtate, from perſons to be ordained, and from the members of both houſes of parliament, &c.

SURA, in anatomy, the calf, or fleſhy part of the leg. The word is alſo uſed by ſome for the fibula; which ſee.

SURBATING, among farriers, is when the ſole of a horſe's foot is worn, bruiſed, or ſpoiled by beating the hoof againſt the ground in travelling without ſhoes, or going in hot ſandy lands, or with a ſhoe that hurts the ſole, lies too flat to it, or the like. Sometimes it alſo happens by over-riding a horſe while young, before his feet are hardened; and ſometimes by the hardneſs of the ground and high lifting his feet. The ſigns hereof are his halting on both fore-legs, and going ſtiff, and creeping as if half foundered. In general, there is nothing better for ſurbated feet, than tar melted into ſoot, or vinegar boiled with ſoot to the conſiſtence of a broth, and put into the ſoot boiling hot, with hurds over it, and ſplints to keep it in.

SURCHARGE, the ſame with overcharge, and whatever is above that which is juſt and right. Surcharge of the foreſt, or a common, is when a commoner puts more beaſts in the foreſt or common than he has a right to do.

SURCINGLE, a girdle wherewith the clergy of the church of England uſually tie their caſſock.

SURCOAT, a coat of arms to be worn over the body armour. The ſurcoat is properly a looſe thin taffetycoat, with arms embroidered or painted on it, ſuch as is worn by heralds: anciently alſo uſed by military men, over their armour, to diſtinguiſh themſelves by.

SURCULUS, in the anatomy of plants, a word uſed to expreſs that part of the branching of the ribs of a leaf which is of a middle kind betwixt the great middle rib and the ſmalleſt reticular ramifications. The middle rib is by the writers on theſe ſubjects, called petiolum. The firſt diviſion that go off laterally from theſe are called rami, or branches; the next diviſion of theſe into more minute ones, ſurculi; and the final devarications of theſe, into the reticular work that ſpreads itſelf over the whole leaf, capillamenta. See Petiole, &c.

SURD, in arithmetick and algebra, denotes any number or quantity that is incommenſurable to unity: otherwiſe called an irrational number or quantity.

The ſquare roots of all numbers, except 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, &c. (which are the ſquares of the integer numbers, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, &c.) are incommenſurables; and after the ſame manner the cube roots of all numbers but of the cubes of 1, 2, 3, 4, 5, 6, &c. are incommenſurables: and quantities that are to one another in the proportion of ſuch numbers, muſt alſo have their ſquare-roots, or cube roots, incommenſurable.

The roots, therefore, of ſuch numbers, being incommenſurable, are expreſſed by placing the proper radical ſign over them: thus, $\sqrt[2]{2}$, $\sqrt[2]{3}$, $\sqrt[2]{5}$, $\sqrt[2]{6}$, &c. expreſs numbers incommenſurable with unity. However, though theſe numbers are incommenſurable themſelves with unity, yet they are commenſurable in power with it; becauſe their powers are integers, that is, multiples of unity.

They may alſo be commenſurable ſometimes with one another, as the $\sqrt[2]{8}$ and $\sqrt[2]{2}$; becauſe they are to one another as 2 to 1: and when they have a common meaſure, as $\sqrt[2]{2}$ is the common meaſure of both, then their ratio is reduced to an expreſſion in the leaſt terms, as that of commenſurable quantities, by dividing them by their greateſt common meaſure. This common meaſure is found as in commenſurable quantities, only the root of the common meaſure is to be made their common diviſor: thus, $\frac{\sqrt{12}}{\sqrt{3}} = \sqrt{4} = 2$, and $\frac{\sqrt{18a}}{\sqrt{2}} = 3\sqrt{a}$.

SURDESOLID, or Sursolid. See Sursolid.

SURETY, in law, generally ſignifies the ſame with bail. See Bail.

SURFEIT, in medicine, a ſickneſs proceeding from the ſenſation of a load at the ſtomach, uſually attended with eruptions, and ſometimes with a fever.

Surfeits may be cauſed, 1ſt, by voracity, from whence the ſtomach and inteſtines are overcharged, digeſtion weakened

weakened, and the chyle rendered crude or viscid, and the blood corrupted. If what was thus devoured were high seasoned or inflammatory, or happens to lie long in the body, it is supposed to cause a fever also; 2dly, the drinking of small liquors in hot weather, or when the body is heated by exercise; which, perhaps, chills the fluids, and gives a check to perspiration; from whence also may arise a fever and eruptions. Summer fruits likewise, as cucumbers, apples, cherries, &c. may have the same effect; 3dly, too great exercise or heat, whence the fluids are rarified and thrown into too rapid a circulation, which being suddenly stopped, as may happen by cooling too fast, there ensues also a stoppage of perspiration; 4thly, by the state or some change of the air; as by blasts, or vehemently hot and sultry weather, or cold winds giving a sudden check to, and preventing perspiration.

Eruptions may not appear in surfeits, either by reason of the slightness of the cause, or some wrong management at the first. Nauseas, oppression, sickness, and sometimes vomiting and a fever, but seldom eruptions, attend an overloaded stomach. This species of a surfeit is called crapula; sickness, gnawing at the stomach, sometimes eruptions, and a fever, attends surfeits, from the bad quality of any thing used as food. The fever always decreases as the eruptions increase: and if these suddenly disappear, the fever increases. Those surfeits which proceed from too great exercise, or too sudden cooling after it, appear with sickness, a fever, and eruptions, though the two last symptoms may be wanting. Those caused from some alteration in the air, and vulgarly called blasts, appear with redness of the face, spots, and a fever, often with blisters on the lips.

SURGE, in the sea language, the same with a wave. See WAVE. Also, when heaving at the capstan, if the cable-royal, or messenger slip a little, they call it surging.

SURGERY, or CHIRURGERY, the art of curing all manner of wounds, and other disorders, where the application of the hand, assisted by proper instruments, is necessary.

SURMOUNTED, in heraldry, is when one figure is laid over another.

SURNAME, or SIRNAME, a name added to the proper or baptismal name, to denote the person of such a family.

SURREJOINDER, is a second defence of the plaintiff's declaration, by way of answer to the defendant's rejoinder.

SURRENDER, in common law, an instrument in writing, testifying, that the particular tenant of lands and tenements for life or years, doth sufficiently consent and agree, that he who has the next or immediate remainder or reversion thereof, shall have the present estate of the same in possession, and that he thereby yields and gives up the same to him.

SURROGATE, in law, denotes a person that is substituted, or appointed in the room of another, and most commonly of a bishop, or of his chancellor.

SURSOLID, or SURDESOLID, in arithmetick and algebra, the fifth power, or fourth multiplication of any number or quantity considered as a root. See the article ROOT.

SURSOLID *Problem*, in mathematicks, is that which cannot be resolved but by curves of a higher nature than a conick section, v. gr. in order to describe a regular endecagon, or figure of eleven sides in a circle, it is required to describe an isosceles triangle on the right line given, whose angles at the base shall be quintuple to that at the vertex; which may easily be done by the intersection of a quadratix, or any other curve of the second gender.

SURVEYING, the art or act of measuring lands; i. e. of taking the dimensions of any tract of ground, laying down the same in a map or draught, and finding the content or area thereof. Surveying, called also geodæsia, is a very ancient art; it is even held to have been the first or primitive part of geometry, and that which gave occasion to, and laid the foundation of all the rest. Surveying consists of three parts or members; the first is the taking of the necessary measures, and making the necessary observations, on the ground itself: the second is the laying down of these measures and observations on paper: and the third, the finding the area orq uantity of the ground thus laid down. The first is what we properly call surveying: the second we call plotting or protracting, or mapping: and the third casting up.

The first, again, consists of two parts, viz. the making of observation for the angles, and the taking of measures for the distances. The former of these is performed by some one or other of the following instruments, viz. the theodolite, circumferentor, semi-circle, plain-table, or compass: the description and manner of using each whereof, see under its respective article. The latter is performed by means either of the chain or the perambulator: the description and manner of applying each whereof, see under its respective article. The second branch of surveying is performed by means of the protractor, and plotting scale. See PLOTTING. The third is performed by reducing the several divisions, inclosures, &c. into triangles, squares, trapeziums, parallelograms, &c. but especially triangles; and finding the areas or contents of these several figures.

SURVEYOR, a person who hath the oversight and care of considerable works, lands, or the like.

SURVEYOR likewise denotes a gauger; as also a person who surveys lands, and makes maps of them.

SURVEYOR *of the Melting*, is an officer of the mint, whose office is to see the bullion cast out, and that it be not altered after the delivery of it to the melter.

SURVEYOR *of the Navy*, an officer whose business is to know the state of all stores, and see the wants supplied; to survey the hull, masts, and yards of ships; to audit the boatswains and carpenters accounts, &c.

SURVEYOR *of the Ordnance*, is an officer whose charge is to survey all the king's ordnance, stores, and provisions of war, in custody of the store-keepers of the Tower of London; to allow all the bills of debts, to keep checks on labourers and artificers work, &c.

SURVIVOR, in law, signifies the longest liver of joint-tenants, or of any two persons jointly interested in a thing; in which case, if there be only two joint-tenants, upon the death of one, the whole goes to the survivor; and if there be more than two, the part of the deceased is divided among all the survivors.

SUSPENSION, *or Points of* SUSPENSION, in mechanicks, are those points in the axis or beam of a ballance, wherein the weights are applied, or from which they are suspended.

SUSPENSION *of Arms*, in war, a short truce agreed on by both armies, in order to bury the dead, wait for fresh instructions, or the like.

SUTURE, *Sutura*, in anatomy, is a particular articulation. The bones of the cranium are joined to one another by four sutures. The first is called the coronalis. It reaches transversely from one temple to the other. It joins the os frontis to the ossa parietalia & petrosa. The second is called lambdoidalis, because it resembles the Greek letter (Λ) lambda. It joins the os occipitis to the ossa parietalia & petrosa. The third is called sagittalis; it begins at the top of the lambdoidalis, and runs straight to the middle of the coronalis. It joins the two ossa parietalia together. The fourth is called sutura squammosa, because the parts of these bones which are joined by this suture, are as it were cut slope-wise and lapped over one another.

This suture joins the semicircular circumference of the ossa temporum to the os sphenoides occipitis, and to the ossa parietalia. The first three sutures were called suturæ veræ; and the last sutura falsa, because it was supposed to have no indentations, which is false.

The bones of the cranium are not only joined to one another, but they are also joined to the bones of the upper jaw by three other sutures. The first is the transversalis; it runs across the face, it passes from the little angle of the eye, down to the bottom of the orbit, and up again by the great angle of the eye, over the root of the nose, and so to the little angle of the other eye. It joins the os frontis to the bones of the upper jaw. The second is the ethmoidalis: it surrounds the bone of that name, and joins it to the bones which are about it. The third is the satura sphenoidalis; it surrounds the os sphenoides, joins it to the os occipitis, the ossa petrosa, and the os frontis.

SWABBER, or CAPTAIN *Swabber*, in a man of war, is a person appointed to see the ship cleaned by a gang of the laziest and refuse of the foremast men, who are under subjection to him.

SWALLOW's-TAIL, in fortification, a kind of out-work, only differing from a single tenaille, in that its sides are not parallel as those of the tenaille, but narrower towards the fortified place, than towards the country.

SWALLOW's-TAIL, in joinery and carpentry, denotes a peculiar way of fastening together two pieces of timber so strongly as they cannot fall asunder. See DOVE-TAIL.

SWANIMOTE, or SWAINMOTE, a court touching matters of the forest, kept by the charter of the forest thrice in every year before the verderers, as judges. This court is as incident to a forest, as a court of Pie-powder to a fair.

SWEAT, *Sudor*, a sensible moisture issuing out of the pores of the skins of animals, through too much heat, exercise, or weakness; or through the action of certain medicines, called sudorificks. Under the skin above the fat are disposed all over the body what we call the miliary glands, which are closely united, each gland furnished with an artery, vein, and nerve, and produce an excretory duct or vessel, which passes through a perforation in the reticular body, and discharges, through a wide orifice, the sweat under the epidermis. These ducts are covered with a hollow and raised valve of a round figure, and seated under the skin; its use is to transmit or restrain the humour. This excretory duct is the principal organ of sweat, in conjunction with the vascula Ruycheiana.

The sweat thus secreted varies according to the differences of air, soil, sex, age, temperament, emunctories, diet, way of living, and time of concoction, almost in the same manner as does the urine. Sweat is seldom or never observed in a sound body, unless from an error of the non-naturals; in its primary effects it is always hurtful, by accident it sometimes proves beneficial. See PERSPIRATION.

SWEATING SICKNESS. See the article SUDOR *Anglicanus*.

SWEET, in the wine trade, denotes any vegetable juice, whether obtained by means of sugar, raisins, or other foreign or domestick fruit, which is added to wines, with a design to improve them. See WINE.

SWEET-WILLIAM, in botany, the English name of a very beautiful species of dianthus. Sweet-Williams are propagated by seeds or slips; those which are raised from seeds are best, not only for blowing stronger, but also for producing new varieties. The season for sowing it is in March; and when the plants are up two or three inches, they should be planted out in beds at seven or eight inches asunder; here they may remain till autumn, when they should be transplanted where it is intended for them to blow, which will be in the succeeding summer.

SWIFTERS, in a ship, are ropes belonging to the fore and main shrouds, for securing the masts.

SWIMMING, the art or act of sustaining the body in water, and of moving therein; in which action the air-bladder and fins of fishes bear a considerable part.

SWINGLING, the beating of flax or hemp, after it has been well broken with the brake; this is done by taking up the flax in handfuls, and then beating it with a rod, or flatted and smooth stick, in order to free it from the bun, and prepare it for being heckled. See FLAX and HEMP.

SYCAMORE-TREE, in botany, the English name of the acer major, or greater maple. See MAPLE.

SYLLABLE, in grammar, a part of a word, consisting of one or more letters, pronounced together. See WORD and PRONUNCIATION.

SYLLABUS, in matters of literature, denotes a table of contents, or an index of the chief heads of a book or discourse.

SYLLEPSIS, in Latin and Greek grammar, is the agreement of a verb or adjective, not with the word next it, but with the word most worthy in the sentence.

SYLLOGISM, in logick, an argument or term of reasoning, consisting of three propositions: the two first of which are called premisses, and the last the conclusion.

Of the three propositions whereof a syllogism consists, the first is, by way of eminence, called the proposition, as being proposed for the basis of the whole argument; the second is called the assumption, as being assumed to assist in inferring the third: though they are both called sumptiones, because assumed for the sake of the third; and both premisses, as being premised to it; and for the same reason both are called antecedents, only the first the major, and the latter the minor.

The third is called the conclusion, as being the close of the whole argumentation; and sometimes complexio, as including the two notions, before separately compared; and consequens, because it follows from the antecedents; and lastly, illatio, because inferred from the premisses by means of the illative particle ergo, therefore, &c.

As the conclusion is the principal part of a syllogism, it hence arises, that, though both the proposition and assumption consist each of its subject and attribute, yet the subject and attribute of a syllogism are properly understood of those of the conclusion.

Again, in the instance abovementioned, animal being used both as the subject and attribute, it is held a kind of intermediate between the two, and frequently called medium; in respect to which, both the subject and attribute, man and thinks, are called extremes, or terms; only the subject the greater extreme, and the attribute the less.

A syllogism, whether simple or compound, may either be categorical, as that already instanced, wherein both premisses are positive.

Or, hypothetical, wherein one or both of the premisses are only supposed: as, "if the sun shines, it is day: but the sun does shine, therefore it is day."

Or, analogical: as, "the base is to the column; so is justice to the commonwealth: but, if the base be withdrawn, the column is overturned; therefore, if justice be taken away, the commonwealth is overturned."

Or, diazeutick or disjunctive; as, "either they mean to please or to profit, but they do not mean to please; therefore they aim to profit."

The most convenient form of a perfect syllogism, is to have the medium in the middle, placed between the subject and attribute; as in the instance abovementioned.

Of this form there are two figures, the one coherent, or conjunct and affirmative; founded on this canon, "that what agrees with any thing, likewise agrees with that wherewith this necessarily agrees."

The other incoherent or disjunct, and negative; founded on this canon, "that what agrees with any thing, disagrees with that wherewith this disagrees."

Of each of these figures there are three modes, viz. general, particular, and mixed.

A syllogism, wherein one of the premisses is suppressed, but so as to be understood, is called enthymeme; e. gr. "every animal thinks, therefore man thinks;" wherein the proposition, "man is an animal," is understood.

The demonstrations of mathematicians, it is observed, are only serieses of enthymemes; so that every thing in mathematicks is concluded or proved by syllogism; only omitting such premisses as occur of their own accord, or as are referred to by the citations.

SYMBOL, *Symbolum*, a sign or representation of any moral thing by the images or properties of natural things.

SYMMETRY, the relation of parity, both in respect of height, length, and breadth of the parts necessary to compass a beautiful whole.

SYMPATHETICK, something that has a sympathy, or that acts, or is acted on by sympathy.

SYMPATHETICK, is particularly applied to all diseases which have two causes, the one remote, and the other near.

SYMPATHETICK *Inks*, are such as can be made to appear and disappear very suddenly, by the application of something which seems to work by sympathy.

Of these we have some very curious instances and experiments, given us by Lemery and Mr. Boyle, to the following effect. 1. To two or three parts of unslaked lime put one of yellow orpiment; powder and mix the two, adding 15 or 16 times as much water as there was orpiment; stop up the phial with a cork and bladder, and set it in warm embers. Shake the phial now and then for five hours, and warily decant the clear part, or rather filtrate it. In the mean time, burn a piece of cork thoroughly, and, when well inflamed, quench it in common water, or rather in brandy. Being thus reduced into a friable coal, grind it with fair water, wherein gum arabick has been dissolved, and it will make a liquor as black as the common ink.

While these are doing, dissolve, in three times as much distilled or strong vinegar, over warm embers, a quantity

quantity of red lead; or of faccharum faturni, in thrice the quantity of water; for three or four hours, or till the liquor have a fweet tafte. This liquor will be as clear as common water.

The liquors thus prepared, write any thing on paper with this laft fort, dry it, and nothing will appear. Over the place, write what you pleafe with the fecond liquor: it will appear as if written with common ink: when dry, dip a fmall piece of rag or fponge in the firft liquor, rub it over the written place, and the black writing will vanifh; and that wrote with invifible ink, appear black and legible.

Again, take a book four or five inches thick, and on the firft leaf write any thing with the laft liquor: turn to the other end of the book, and rub there with a rag, dipped in the firft liquor, on that part, as near as you can guefs, oppofite to the writing; and leave alfo the rag there, clapping a paper over it, then nimbly fhutting the book, ftrike four or five fmart ftrokes thereon with your hand, and, turning the other fide uppermoft, clap it into a prefs, or lay it under a good weight for a quarter of an hour, or even half that time: then will the writing done with the invifible ink be found black and legible.

2. Diffolve white or green vitriol in water, and, writing with the folution, nothing will appear. Boil galls in water, and dip a linen rag in the decoction, and with it rub the place before writ, and it will appear black and legible. Rub it over again with fpirit of vitriol, or its oil, and the writing will difappear again: rub it over again with oil of tartar per deliquium, the letters will appear again, but of a yellow colour.

SYMPATHY, an agreement of affections and inclinations, or a conformity of natural qualities, humours, temperaments, &c. which make two perfons delighted and pleafed with each other.

Sympathy, is alfo ufed in regard to inanimate things, intimating fome prepofition they have to unite, or to act on one another.

Sympathy, in medicine, an indifpofition befalling one part of the body, through the defect or diforder of another; whether it be from the affluence of fome humour, or vapour fent from elfewhere; or from the want of the influence of fome matter neceffary to its action.

SYMPHONY, in mufick, properly denotes a confonance or concert of feveral founds agreeable to the ear, whether vocal or inftrumental, called alfo harmony.

SYMPHISIS, in anatomy, one of the kinds of junctures, or articulations of the bones. See the article Articulation.

SYMPHYTUM, comfrey, in botany, a genus of plants, whofe flower is monopetalous and campanulated. The greater comfrey, called confolida major, grows wild in divers parts of England: it has a thick flefhy root, divided into feveral parts, black without, but white and clammy within: the lower leaves are hairy, large, fharp pointed, and of a dark green colour: the ftalk rifes to about two feet high, and are light, hairy, rough, and winged; thefe are terminated by loofe bunches of flowers, of a whitifh colour, and blow in July. Its root has the fame qualities as marfh-mallow; it is recommended in ulcers of the lungs, and other diforders that proceed from the acrimony of the humours: outwardly, it is faid to cure wounds, but is now feldom or never ufed for that purpofe.

SYMPTOM, in medicine, any appearance in a difeafe, which ferves to indicate or point out its caufe, approach, duration, event, &c. See Disease, &c.

SYMPTOMATICAL, in medicine, is a term often ufed to denote the difference between the primary and fecondary caufes in difeafes.

SYNÆRESIS, contraction, in grammar, a figure whereby two fyllables are united as one; as vemens for vehemens.

SYNAGOGUE, *Synagoga*, a particular affembly of Jews, met to perform the offices of their religion. Alfo the place wherein they meet.

SYNARTHROSIS, in anatomy, a fpecies of articulation, wherein there is only an obfcure motion, as in the bones of the carpus and metacarpus, the tarfus and metatarfus, &c. or there is no motion at all, as in the futures of the fkull, and articulations per harmoniam, or bare application.

SYNCOPE Fainting, in medicine, a deep and fudden fwooning, wherein the patient continues without fenfible heat, motion, fenfe, or refpiration, and is feized with a cold fweat over the whole body, and all the parts turn pale and cold as if dead.

Syncope, in grammar, denotes an elifion or retrenchment of one or more letters or fyllables from a word. As when we fay, virum for virorum, and manet alta mente repoftum, for repofitum.

SYNDICK, in government and commerce, an officer in divers countries, intrufted with the affairs of a city or other community; who calls meetings, makes reprefentations and follicitations to the miniftry, magiftracy, &c. according to the exigency of the cafe.

Syndick, is alfo ufed for a perfon appointed to follicit fome common affair, wherein he himfelf has a fhare; as happens, particularly, among feveral creditors of the fame debtor, who fails or dies infolvent.

SYNDROME, the concourfe or combination of fymptoms in any difeafe.

SYNECDOCHE, in rhetorick, a kind of figure, or rather trope, frequent among orators and poets.

There are three kinds of fynecdoches; by the firft, a part is taken for the whole; as the point for the fword, the roof for the houfe, the fails for the fhip, &c. By the fecond, the whole is ufed for a part. By the third, the matter whereof the thing is made, is ufed for the thing itfelf; as fteel for fword, filver for money, &c. To which may be added another kind, where the fpecies is ufed for the genus; or the genus for the fpecies. As, He bore the fin of many, i. e. of all.

SYNGENESIA, the name of the 19th clafs in the Linnæan fyftem of botany; fo called becaufe the antheræ (which are the part more immediately fubfervient to generation) are in this clafs united in a cylinder, and perform their office together. This clafs confifts of fuch plants as bear compound flowers; the general characters are, the common cup is a perianthium, which contains the florets and the receptacle; it is either fimple, augmented, or imbricated; it contracts when the flowers are fallen, but expands and turns back when the feeds are ripe.

The common receptacle of the fructification receives many feffile florets on its difck, and is of different forms. Some of the flowers in this clafs are, 1. Compofed of tubulofe hermaphrodite florets in the difck, and of the fame fort in the radius. 2. Others are compofed of tubulofe hermaphrodite florets in the difck, and of tubulofe female florets in the radius. 3. Some are compofed of tubulofe hermaphrodite florets in the difck, and of tubulofe neutral florets in the radius. 4. Some have tubulofe hermaphrodite florets in the difck, and ligulated hermaphrodite florets in the radius. 5. Some are compofed of tubulofe hermaphrodite florets in the difck, and of ligulated female florets in the radius. 6. Some are compofed of tubulofe hermaphrodite florets in the difck, and ligulated neutral ones in the radius. 7. Some are compofed of tubulofe hermaphrodite florets in the difck, and of naked and neutral florets in the radius. 8. Some are compofed of tubulofe male florets in the difck, and of naked female ones in the radius. And, 9. Some are compofed of ligulated female florets in the difck, and ligulated hermaphrodite ones in the radius.

The corollulæ are monopetalous and feated on the germina, and are either tubulated, ligulated, or tridentated: the ftamina are five very fhort filaments, inferted in the neck of the corollulæ; the antheræ are of the fame number, and are linear, erect, and grow together at their fides, fo as to form a tubulate cylindrick body the length of the limb, and quinquedentated at the edge: the germen is oblong, and placed under the receptacle of the flower: the ftyle is flender, erect, the length of the ftamina, and perforates the cylinder formed by the antheræ: the ftigma is divided into two parts, which ftand open and bend backwards: there is no true pericarpium: the feed is fingle, oblong, often tetragonal, but commonly narrow at the bafe.

In fome genera they are crowned with down, but in others it is wanting; in fome the downy matter is compofed of a great number of fingle fhort threads placed circularly or otherwife; on the head of the feed, in fome, the down is radiated, in others ramofe or branched, and in fome it is fupported on a pedicle, while in others it ftands immediately on the feed. In fome genera the feeds have no down at all, but have a fmall corona

formed

formed of what was originally the cup of the corollulæ, this is permanent, and divided usually into five segments. In some genera the seed is wholly naked, having neither down or cup. The genera of this class are very numerous, most of which are bitter and stomachick.

SYNOD, in astronomy, a conjunction, or concourse of two or more stars or planets in the same optical place of the heavens.

SYNOD, or *Council*, in ecclesiastical history, imply a meeting, or assembly of bishops or governors of the church, to rectify abuses in faith or discipline, to enact laws or canons for the government of the church, and to regulate all matters relating to the state of religion.

SYNTAX, συνταξις, in grammar, the construction or connection of the words of a language into sentences, or phrases.

F. Buffier more accurately defines syntax, the manner of constructing one word with another, with regard to the different terminations thereof, prescribed by the rules of grammar.

SYNTHESIS, in logick, denotes a branch of method opposite to analysis, called the synthetick method. See METHOD.

SYRINGA, the lilack, in botany, a genus of plants, whose flower is monopetalous and funnel-shaped; the tube of the corolla is cylindrick and very long, and the limb is divided into four obtuse plane segments; the stamina are two very short filaments, topped with small antheræ within the tube; the fruit is an oblong, compressed, acuminated capsule, having two cells, and opening with two valves, contrary to the partition; each cell containing an oblong, compressed, pointed seed, with a membranaceous margin. The lilack is a common shrub, and much admired for the beauty of its leaves and fine bunches of flowers, which come out in May; it is easily propagated from suckers, in which it is very prolifick, these may be taken off in autumn, and planted where they are to remain.

SYRINGA, is a name more commonly applied to the philadelphus of Linnæus. See PHILADELPHUS.

SYRINGE, an instrument serving to imbibe, or suck in a quantity of any fluid, and to squirt or expel the same with violence.

SYRUP, SYRUPUS, or SIRUPUS, in pharmacy, is a liquid form of medicine prepared of decoctions, juices, or infusions, preserved by means of honey or sugar, and reduced to such a consistence, that a drop let fall on a marble does not spread. Sirups, like all other officinal preparations, may be made to answer various intentions, and, consequently, may be either of a cooling, heating, drying, inciding, expectorating, incrassating, diuretick, sudorifick, lithontriptick, alexiterial, or corroborating quality, according to the different virtues of the several ingredients of which they are prepared.

General rules for the making of sirups.

1. The sugar employed for sirups made without coction, should first be boiled with water to a candy consistence; observing to clarify it with the white of eggs, and by despumation. But the whitest and purest sugar, and sugar-candy, do not require this labour. The sugar thus prepared ought afterwards to be powdered, that it may dissolve the easier. 2. Though a double weight of sugar, in proportion to the liquor, may be required in making such sirups; yet a less proportion will generally suffice. First, therefore, dissolve only an equal quantity of sugar; then, by degrees, add a little more in powder, till it remain undissolved at the bottom, to be afterwards incorporated by the gentle heat of a water bath. 3. Acid sirups, or those made with the juices of fruits, should not be put into copper-vessels, unless such as are tinned. 4. What should be observed of decoctions in general, is also to be understood of decoctions for sirups. The vegetables, used either for decoctions or infusions, are to be moderately dried, unless they are expresly required fresh gathered. 5. Sirups made by coction are to be clarified with the white of eggs, except diacodium; which, therefore, requires the purest sugar. The solutive and purging sirups ought rather to be made of brown sugar.

SYSTEM, *Systema*, an assemblage or chain of principles, or conclusions, or the whole of any doctrine, the several parts whereof are bound together, or follow, or depend on each other.

SYSTEM, in astronomy, denotes an hypothesis or supposition of a certain order and arrangement of the several parts of the universe; whereby astronomers explain all the phænomena or appearances of the heavenly bodies, their motions, changes, &c.

The most celebrated hypotheses, or systems of the world, are three, viz. the Ptolomaick, Tychonick, and Pythagorean, or Copernican system.

Ptolemaick SYSTEM, so called from its inventor, Claudius Ptolemæus, a famous astronomer of Pelusium, in Egypt, supposes the earth immoveably fixed in the centre, not of the world only, but of the universe; and that the sun, the moon, the planets, and stars, all moved about it from east to west once in 24 hours, in the order following, viz. the moon, Mercury, Venus, the sun, Mars, Jupiter, Saturn, the fixed stars; and, above all, the figment of their primum mobile, or the sphere which gave motion to all the rest.

This system was first invented and adhered to, chiefly, because it seemed to correspond with the sensible appearances of the celestial motions. They took it for granted, that the motions which those bodies appeared to have, were such as they truly and really performed; and not dreaming of any motion in the earth, nor being apprised of the distinction of absolute, relative, or apparent motion, they could not make a proper judgment of such matters, but were under a necessity of being misled by their very senses, for want of proper assistance which after-ages produced.

It is easy to observe, they had no notion of any other system but our own, nor of any other world but the earth on which we live. They thought nothing less than that all things were made for the use of man; that all the stars were contained in one concave sphere, and, therefore, at an equal distance from the earth; and that the primum mobile was circumscribed by the cœlum empyreum of a cubick form, which they supposed to be the heaven, or blissful abode of departed souls.

It would scarce have been worth while to have said so much about so absurd an hypothesis (as this is now well known to be) were it not that there are still numerous retainers thereto, who endeavour very zealously to defend the same, and that for two reasons principally, viz. because the earth is apparently fixed in the centre of the world, and the sun and stars move about it daily; and also, because the scripture asserts the stability of earth, the motion of the sun, &c.

These two arguments merit no particular answer. It is sufficient, with respect to the first, to say, that we are assured things may (nay must) appear to be, in many cases, what they really are not, nay, to have such affections and properties as are absolutely contrary to what they really possess. Thus a person sitting in the cabin of a ship under sail, will, by looking out at the window, see an apparent motion of the houses, the trees, &c. on the strand, the contrary way, but will perceive no motion at all in the ship. Also, a person sitting in a wind-mill, if the mill be turned about, he will see an apparent motion of the upright post the contrary way, but will not perceive any in the mill itself.

All those cases are exactly parallel to that of the earth; and it is as rational to assert the ship and the mill are really quiescent, and the other bodies positively in motion, as it is to insist on the motion of the sun, and the earth's being at rest in the centre.

As to the scripture, as it was never intended for an institution of astronomy or philosophy, so nothing is to be understood as strictly or positively asserted in relation thereto, but as spoken only agreeably to the common phrase, or vulgar notion of things. And thus Sir Isaac Newton himself would always say, the sun rises, and the sun sets; and would have said with Joshua, sun, stand thou still, though he well knew it was quite contrary in the nature of the thing.

Tychonick SYSTEM. This owes its origin to Tycho Brahe, a nobleman of Denmark, who lived in the latter part of the last century; he made his observations at Uraniburg (i. e. celestial tower) in the island of Weer or Huena. This philosopher, though he approved of the Copernican System, yet could he not reconcile himself to the motion of the earth; and being, on the other hand, convinced the Ptolomean scheme, in part, could not be true, he contrived one different from either, which is represented by the diagram referred to.

In

In this the earth has no motion allowed it, but the annual and diurnal phænomena are folved by the motion of the fun about the earth, as in the Ptolomaick fcheme; and thofe of Mercury and Venus are folved by this contrivance, though not in the fame manner, fo fimply and naturally, as in the Copernican fyftem; as is eafy to obferve in the figure.

After this fcheme had been propofed fome time, it received a correction, by allowing the earth a motion about its axis, to account for the diurnal phænomena of the heavens; and fo this came to be called the femi-Tychonick fyftem. But this was ftill wide of the truth, and encumbered with fuch hypothefis, as the true mathematician and genuine philofopher could never relifh.

Copernican SYSTEM. See COPERNICAN *Syftem*.

SYSTEM, in poetry, implies a certain hypothefis, or fcheme of religion, from which the poet is never to recede.

SYSTEM, in mufick, fignifies a compound interval; or an interval compofed, or conceived to be compofed, of feveral leffer intervals. Such as the octave, &c.

Concinnous SYSTEMS, are thofe confifting of fuch parts as are fit for mufick, and thofe parts placed in fuch an order between the extremes, as that the fucceffion of founds, from one extreme to another, may have a good effect.

Inconcinnous SYSTEMS, are thofe where the fimple intervals are inconcinnous, or ill-difpofed, betwixt the extremes.

SYSTOLE, in anatomy, the contraction of the heart, whereby the blood is drawn out of its ventricles into the arteries; the oppofite ftate to which is called the diaftole, or dilatation of the heart.

The fyftole of the heart is well accounted for by Dr. Lower, who fhews that the heart is a true mufcle, the fibres of which are acted on like thofe of other mufcles, by certain branches of the eight pair of nerves inferted into it, which bring the animal fpirits from the brain hither. By a flux of thefe fpirits the mufcular fibres of the heart are inflated and thus fhortened, the length of the heart diminifhed, its breadth or thicknefs increafed, the capacity of the ventricles clofed, the tendinous mouths of the arteries dilated, thofe of the veins fhut up by means of their valves, and the contained juice forcibly expreffed in the orifices of the arteries.

Dr. Drake adds to Dr. Lower's account, that the intercoftal mufcles and diaphragm contribute to the fyftole, by opening the blood a paffage from the right ventricle of the heart to the left, through the lungs, to which it could not otherwife pafs, becaufe the oppofition the blood contained in that ventricle muft neceffarily have made to its conftriction, is taken off. Both thefe authors make the fyftole the natural ftate, or action of the heart, and the diaftole the violent one. Boerhaave, on the contrary, makes the fyftole the violent, and the diaftole the natural ftate.

SYSTYLE, in architecture, that manner of placing columns where the fpace between the two firft confift of two diameters, or four modules.

SYZYGY, in aftronomy, a term equally ufed for the conjunction and oppofition of a planet with the fun. On the phænomena and circumftances of the fyzygies a great part of the lunar depends. See MOON.

T.

T A confonant, and the nineteenth letter in the alphabet.

T has its proper found in tan, ten, tin, ton, tun; fat, let, hit, hot, put. When it comes before (i) followed by another vowel, it is founded like f, as in nation, potion, expatiate, &c. When afpirated, that is, when h comes after it, it has a twofold found; one clear and acute, as thin, theory, &c. the other more obfure and obtufe, as in thofe, their, &c. It is faid, by fome, that T founds like ch before eous, ous, uous; as in beauteous, portentous, tortuous; but this feems a vicious pronunciation.

T, among the ancients, was ufed as a numeral letter, fignifying 160. When a dafh was added a-top thus, $\bar{T}$, it fignified 160,000.

When the tribunes approved of the decrees of the fenate, they teftified their confent by fubfcribing a T.

T, or TAU, in heraldry, is a kind of crofs patent, or truncated; found in all the armouries of the commanders of the order of St. Anthony.

TABBY, in commerce, a kind of coarfe taffety watered. It is manufactured like the common taffety, excepting that it is ftronger and thicker both in woof and warp.

TABBYING, the paffing ftuff under the calendar, to make a reprefentation of waves thereon, as on a tabby.

TABELLA, or TABLET, *Tabulatum*, in pharmacy, a folid kind of electuary, or confection, made of dry ingredients, ufually with fugar, and formed into little fla morfels or fquares; more ufually called lozenges, and fometimes morfelli, troches, &c.

TABERNACLE, *Tabernaculum*, among the Jews, the place wherein the ark of the covenant was lodged; both while they were in tents, during their journey from Egypt; and when fixed in Jerufalem, the ark was kept in the temple.

Feaft of TABERNACLES, a folemn feftival of the Hebrews, obferved after harveft, on the 15th day of the month Tifri, inftituted to commemorate the goodnefs of God, who protected the Ifraelites in the wildernefs, and made them dwell in booths when they came out of Egypt: On the firft day of the feaft they began to erect booths of the boughs of trees; and in thefe they were obliged to continue feven days. The booths were placed in the open air, and were not to be covered with cloths, nor made too clofe by the thicknefs of the boughs; but fo loofe that the fun and the ftars might be feen, and the rain defcend through them. In thefe they eat, drank, and flept, during the continuance of the feftival.

TABES, in medicine, or TABES *Dorfalis*, arifes from a diforder of the fpinal marrow, and is principally incident to perfons of a falacious difpofition, or fuch as are newly married. The patients are free from a fever, eat and digeft well. The perfon labouring under this diforder, when interrogated with refpect to his ftate, affirms, that he perceives, as it were, ants falling from the fuperior part of his body, his head, for inftance, into the fpine of the back; and when he difcharges his urine or excrements, there is at the fame time a copious evacuation of liquid femen, in confequence of which he is incapable of propogating his fpecies, anfwering the purpofe of marriage, or being amufed with venereal dreams. He is generally fhort-breathed and weak, efpecially after running, or walking up a fteep place; he perceives a fenfe of weight in his head, and is afflicted with a ringing of his ears. The patient is, in procefs of time, feized with various fpecies of violent fevers, and at laft dies of that kind of fever called lipyria; i. e. a fever, where the external parts are cold, and the internal burn at the fame time.

This efflux of the nutritious juice being once ftopped by art, the difpirited and impoverifhed blood muft be replenifhed, as foon as may be, with new chyle, by fuch food as is delicious, affords a good juice, and is moft grateful to the patient's ftomach, given often in a day, though in a little quantity at a time. And that the appetite may be more excited, let him be advifed to be chearful, for there is nothing deftroys the appetite, and confirms a confumption, more than grief or fadnefs. Let him alfo enjoy the benefit of the open air, which is beneficial to the nerves, and, confequently to the appetite and ftomach. But he muft religioufly abftain from wine and fpirituous liquors, which are fubject to put the blood,

which was before too hot, into a greater flame. No purges are to be used to procure any other considerable evacuation, which may create further expences to nature, when she is already weak.

TABLATURE, in anatomy, a division or parting of the skull into two tables.

TABLE, in architecture, a smooth simple member or ornament of various forms, but most usually that of a long square.

Projecting TABLE, is such a one as stands out from the naked of the wall, pedestal, or other matter it adorns.

Rake TABLE, is that which is hollowed in the die of a pedestal or elsewhere, and which is usually encompassed with a moulding.

Razed TABLE, an embossment in a frontispiece, for the putting an inscription, or other ornament, in sculpture. This is what M. Perrault understands by abacus in Virtruvius.

Crowned TABLE, that covered with a cornice, and wherein is cut a basso relievo, or a piece of black marble incrustated for an inscription.

Rusticated TABLE, that which is pricked, and whose surface seems rough, as in grottos, &c.

Plain TABLE, a surveying instrument. See PLAIN *Table*.

TABLE *of Pythagoras*, the common multiplication table. See MULTIPLICATION.

Laws of the twelve TABLES, were the first set of laws of the Romans, thus called, either by reason the Romans then wrote with a style on thin wooden tables covered with wax; or rather, because they were engraven on tables or plates of copper, to be exposed in the most noted part of the publick forum.

TABLES *of the Law*, in Jewish antiquity, two tables on which were written the Decalogue, or Ten Commandments, given by God to Moses on Mount Sinai.

TABLE, is also used for an index, or repertory put at the beginning or end of a book, to direct the reader to any passage he may have occasion for.

TABLES, in mathematicks, are systems of numbers calculated to be ready at hand for the more easy and expeditious performing mathematical operations.

Astronomical TABLES, are computations of the motions, places, and other phænomena of the planets, both primary and secondary.

TABLING *of Fines*, is the making a table for every county where his majesty's writs run, containing the contents of every fine passed each term.

TABOR, *Tabourin*, a small drum.

TACAMAHACA, in pharmacy, a solid resin, improperly called a gum, in the shops: it is of a fragrant and peculiar smell, and is of two kinds; the one called the shell-tacamahaca, which is the finest: the other, which is an inferior kind, being termed rough-tacamahaca or tacamahaca in grains.

Some greatly commend tacamahaca in disorders of the breast and lungs; but, at present it is very rarely used internally. Externally, however, it is in repute for softening tumours, and mitigating pain and aches.

TACHYGRAPHY, the art of fast, or short writing. The word is formed from the Greek ταχυς, *swift*, and γραφη, *writing*.

There have been various kinds of tachygraphy invented: among the Romans, there were certain notes used, each whereof signified a word. The Rabbins have a kind of tachygraphy formed by abbreviations, which make a kind of technical words; wherein each consonant stands for a whole word, as רמבם, *Rambam*; which expresses *Rabbi Moses, son of Maimon*; רשי, *Raschi*; which stands for Rabbi Schelomoh Jarri. In France, &c. the only tachygraphy used is the retrenching of letters, or even syllables of words; as in *sdm* for *secundam*; *aut* for *autem*; *d* for *sed*; *o* for *non*; *participaon* for *participation*, &c. The first printers imitated these abbreviations; at present they are almost laid aside, except among scriveners, &c.

In England we have great variety of methods of tachygraphy, or short-hand; more by far, and those too, much better, easier, speedier, and more commodious, than are known in any other part of the world: witness Shelton's, Wallis's, Webster's, Weston's, Gurney's, and Byrom's short-hands.

TACK *about*, in navigation, a term used at sea when a ship's head is brought about so as to lie the contrary way. To effect this, they first make her stay; which done, she is said to be paid. They then let rise and haul, i. e. let the lee-tack rise, and haul-aft the sheets, and so trim all the sails by a wind, as they were before.

TACKLE, or TACKLING, in navigation, includes all the ropes or cordage of a ship, whereby the sails, &c. are managed.

TACTICKS, the art of disposing forces in form of a battle, and of performing the military motions and evolutions.

TADPOLE, a young frog, before it has disengaged itself from the membranes that envelope it in its first stage of life. This animal furnishes the curious in microscopick observations with a beautiful view of the circulation of the blood, especially when it is young. The method of procuring them for this purpose in the greatest perfection, is this: let a small quantity of frog's spawn be kept some days in water, and from this will be produced a vast number of young tadpoles; these, while very young, are perfectly transparent, and when placed before the double microscope, the heart may be easily seen, and its pulsation regularly observed; and the blood protruded thence may be beautifully seen circulating through the whole body; but particularly in the tail, where, though so very minute, more than fifty vessels may be seen at one view. The young brood grow more and more opake every hour, and in a day or two the circulation of the blood can only be seen in their tail, or in the fins near the head.

TÆNIA, or TENIA, in architecture, a member of the Dorick order, resembling a square fillet, or reglet, and serving in lieu of a cymatium.

TAFFAREL, or TAFFEREL, in a ship, is a rail all round the poop and quarter-deck.

TAFFETY, in commerce, a kind of fine, smooth, silken stuff, having usually a remarkable lustre or gloss.

Dragon's TAIL, *Cauda Draconis*, in astronomy, the descending node of a planet, thus characterised ☋. See NODE.

TAIL *of a Comet*; when a comet darts his rays forwards, or towards that part of the heavens whither his proper motion seems to be carrying him, those rays are called its beard: on the contrary, when its rays are short behind, towards that part from whence it seems to move, the rays are called the tail of the comet. See COMET.

TAIL *of the Trenches*, in the military art, is the post or place where the besiegers begin to break ground to cover themselves from the fire of the town.

TAIL, or TAILE, in common law, signifies a limited fee, as opposite to fee-simple. The limitation of tail is either special or general.

TAIL *special*, is that whereby lands and tenements are limited to a man and his wife, and the heirs of their two bodies together. It is called special, because if the man bury his wife before issue, and take another, the issue by his second marriage cannot inherit the land.

TAIL *after Possibility of Issue extinct*, is where land is given to a man and his wife, and the heirs of their two bodies, and the one over-lives the other, without issue between them begotten; upon which the survivor shall hold the land for term of his own life in quality of tenant in tail after the possibility of issue extinct; and, notwithstanding he does waste, shall not be impeached of it. And if he be an alien, he, in the reversion, shall not have a writ of an entry in consimili casu, but may enter, and his entry is lawful.

TAILLOIR, in architecture, a term which some of our writers, after the French, use for abacus.

TALCK, in natural history, a large class of fossil bodies, composed of broad, flat, and smooth laminæ or plates laid evenly and regularly on one another; easily fissile, according to the site of these plates, but not all so in any other direction; flexile, and elastick; bright, shining, and transparent; not giving fire with steel, nor fermenting with acid menstrua, and sustaining the force of a violent fire without calcining.

TALENT, *Talentum*, a weight and a coin, both very famous among the ancients, but very different in different countries. The value of the talent is very hard to assign in English money, as being used among all the people throughout the east; and its value, and the manner of computation, different among each. A difficulty abundantly shewn by Budæus, in his learned treatise de Asse.

There

There were various kinds of talents, both with regard to weight and to ſpecies; the value of theſe laſt ſtill increaſing, as the metal whereof it conſiſted was purer: though the talent weights all contained the ſame number of pounds and drachms. For as the French have a livre Pariſis and a livre Tournois, each whereof contains alike 20 ſols; yet, theſe compared together, the Paris livre contains 25 ſols of the Tournais livre, the Paris ſol exceeding that of Tours by one fifth; ſo all talent weights were equally 60 minæ, and the mina 100 drachmæ; but, the drachma of one place exceeding that of another, there hence aroſe a difference in the talents.

The Attick drachma for inſtance, was 60 Attick oboli, and that of Ægina 10 of the ſame oboli; whence the Æginean talent, computed on the foot of the Attick weight, was 100 minæ: whereas reckoned on the foot of its own drachma, it was no more than 60.

The common Attick talent then (the talent weight we mean) contained 60 Attick minæ, or 62 and a half Attick pounds, or 6000 Attick drachmæ; equal, according to Dr. Arburthnot's reduction, to 56 pounds 11 ounces Engliſh troy weight. Some authors, as Priſcian, mention another Attick talent of 100 minæ; but this is to be underſtood of ancient minæ, as they ſtood before Solon, each only worth 75 drachmæ.

The Syrian talent contained 15 Attick minæ; that of Alexandria 96 Attick minæ, or 91 lib. troy. The Babylonick, Perſian, and Anthiochick talents were the ſame with the Egyptian. Among the Romans there were two kinds of talents, the little and the great talent: the little was the common talent; and whenever they ſay, ſimply, talentum, they are to be underſtood of this: the little talent was 60 minæ, or Roman pounds; the mina or pound, eſtimated at 100 drachma, or denarii: it was alſo eſtimated at 24 great ſeſterces, which amounted to 60 pounds.

The great talent exceeded the leſs by one third part. Budæus computes, that the little talent of ſilver was worth 75 pounds ſterling; and the greater 99l. 6s. 8d. ſterling. The greater talent of ſilver he makes worth 99l. ſterling. The greater of gold worth 1125l. ſterling.

TALENT, as a ſpecies, or money, among the Hebrews, was ſometimes uſed for a gold coin, the ſame with the ſhekel of gold, called alſo ſtater, and weighing only four drachms. The Hebrews reckoned by theſe talents as we do pounds, &c. Thus a million of gold, or million of talents of gold, among them, was a million of ſhekels, or nummi; the nummus of gold being the ſame weight with the ſhekel, viz. four drachms.

Yet the Hebrew talent weight of ſilver, which they called cicar, was equivalent to that of 3000 ſhekels, or 113 pounds Engliſh troy weight, according to Arbuthnot's computation.

TALIO, *Lex Talionis*, or *Pœna Talionis*, a retribution or puniſhment whereby an evil is returned perfectly like that committed againſt us by another, which is what we uſually expreſs eye for eye, tooth for tooth.

TALLAGE, *Tallagium*, a certain rate, according to which barons and knights were anciently taxed by the king towards the expences of the ſtate, and inferior tenants by their lords on certain occaſions.

TALLOW, a ſort of animal fat melted down and clarified.

TALLOW-TREE, in China, is a tree growing in great plenty in that country, which produces a ſubſtance like our tallow, and ſerving for the ſame purpoſe.

TALLIES *of Loans*, one part whereof is kept in the exchequer, and the other part given to particular perſons in lieu of an obligation for the monies they have lent to the government on acts of parliament. This laſt part is called the ſtock, and the former the counter ſtock, or counter tail.

TALMUD, or THALMUD, a Jewiſh book, wherein is collected all that relates to the explication of their law.

TALON, in architecture, a kind of moulding conſiſting of a ſquare fillet, frequently found to terminate ornaments of joiners work, as thoſe of doors.

TALPA, in medicine, is a tumour generally confined to the head, and appearing as the conſequence of the venereal diſeaſe. The talpæ elevate the ſkin from the pericranium, and generally denote a foulneſs of the bone beneath; but the nates are generally ſeated in the neck.

TALUS, or TALUT, in architecture, the inclination or ſlope of a work; as of the outſide of a wall, when its thickneſs is diminiſhed by degrees as it riſes in height, to make it the firmer.

TALUS, in fortification. Talus of a baſtion, or rampart, is the ſlope or diminution allowed to ſuch a work, whether it be of earth or ſtone, the better to ſupport its weight.

The exterior TALUS *of a Work*, is its ſlope on the ſide towards the country; which is always made as little as poſſible, to prevent the enemies ſcalado; unleſs earth be bad, and then it is abſolutely neceſſary to allow a conſiderable talus for its parapet. The interior talus of a work is its ſlope on the inſide towards the place.

TAMARINDS, *Tamarindi*, a pulpy matter which has, in its natural ſtate, ſurrounded and incloſed the ſeeds of a tree of the ſame name between the two membranes of the pods, with which nature has defended them externally from injuries. It is a thick, tough, and viſcid maſs, of the conſiſtence of honey, and of a blackiſh, browniſh, or rediſh colour. It is of an agreeable acid taſte, and is generally mixed with a larger or ſmaller quantity of ſugar, in order to its keeping. The tree which produces them is of the number of the triandria monogynia of Linnæus, and of the arbores ſiliquoſæ flore uniformi of Mr. Ray. It is deſcribed by all the botanical writers under the name of tamarindus, and ſiliqua Arabica. The tree riſes to the height of our walnut-trees, and ſpreads as broad with its branches as they do; the leaves are pinnated in the manner of thoſe of the aſh.

We uſe tamarinds as a purge, but they are extremely mild and gentle in their operation, and therefore require to be given in a very large doſe to have any viſible effect, and after giving a ſtool or two, they prove gently aſtringent. They are given in fevers to quench thirſt, and to temperate the acrimony of the humours. They are ſaid to cure the jaundice without the aſſiſtance of any other medicine, and in bilious diarrhœas, and nephritick complaints, they have been known to do eminent ſervice.

Tamarinds are found to increaſe conſiderably the purgative virtues of manna and caſſia, and, when they are intended to operate briſkly, ought always to be given with them. Tamarinds alone may be taken an ounce or two at a time, and are ſeldom found to purge over-much thoſe who eat much larger quantities, on account of their pleaſantneſs. They are an ingredient in the lenitive electuary, and are a very proper admixture with the reſinous purges, ſuch as ſcammony, reſin of jalap, and the like.

TAMBACK, or TAMBAQUA, a mixture of gold and copper, which the people of Siam hold more beautiful, and ſet a greater value on than gold itſelf.

TAMBOUR, in architecture, a term applied to the Corinthian and Compoſite capitals, as bearing ſome reſemblance to a drum which the French call tambour.

TAMBOUR is alſo uſed for a little box of timber-work covered with a ceiling, within-ſide the porch of certain churches, both to prevent the view of perſons paſſing by, and to keep off the wind, &c. by means of folding doors.

TAMBOUR alſo denotes a round coarſe ſtone, ſeveral whereof form the ſhaft of a column not ſo high as a diameter.

TAMPION, or TOMPION, a plug, ſerving to ſtop the mouths of cannon, mortars, &c. to prevent their being wet, and to keep them clean within.

TAN, the bark of the oak, chopped and ground by a tanning mill into a coarſe powder to be uſed in the tanning or dreſſing ſkins.

TANGENT, in geometry, a right-line which touches a circle but in one point, and conſequently, if infinitely produced, could never cut the ſame.

TANGENT *of an Arch*, is a right-line drawn perpendicularly from the end of a diameter, paſſing to one extremity of the arch, and terminated by a right-line drawn from the centre, through the other extremity of the arch.

Co-TANGENT *of an Arch*, is the tangent of the complement of that arch.

TANGENT *of a Curve*, is a right-line which only touches the curve in one point, but does not cut it.

Line of TANGENTS, a line uſually placed on the ſector and Gunter's ſcale.

TANNING, the art of preparing ſkins or hides in a pit, with tan and water.

What we call tan, from which the art derives its name, is the bark of oak, chopped and ground by a tanning-mill into a coarſe powder. When the bark is taken off the trees, it muſt be well dried in the ſun, and ſhaved ſmall,

ſmall, then dried again on a kiln, and placed in piles in a houſe. Where oak-bark is ſcarce, that of thorns may ſupply the defect. New tan is moſt eſteemed; when old and ſtale, it loſes a deal of its effect, which conſiſts in ſhutting up the pores of the ſkin; ſo that, the longer the ſkins are kept in the tan, the more ſtrength and fineneſs they acquire.

The art of tanning regards only the hides of bullocks, cows, calves, and horſes; the method whereof for oxes hides is as follows: the ſkin being flayed off the carcaſe, if it is intended to be kept, is ſalted with ſea-ſalt, mixed with allum, or with a ſort of ſalt-petre, called natron. If it be not intended to be kept, the ſalting is ſaved, as being of no uſe, but to prevent the hide from corrupting, before it can be conveniently carried to the tan-yard. Whether the hides have been ſalted or not, the tanner begins with taking off the horns, the ears, and the tail; after which it is thrown into water for about 30 hours, to waſh off the blood and other impurities adhering to the inſide. This done, it is put into a lime-pit prepared over night, where it continues about 12 hours; after which it is left to drain for three or four days on the edge of the pit. This preparation being over, it is returned into a ſtrong lime-pit for two or three days, then taken out for four more; and thus, for ſix weeks, alternately taken out and put in twice a week. At the ſix weeks end it is put into a freſh pit, where it continues eight days, and is taken out for ſo many; and thus alternately for a year or 18 months, according to the ſtrength of the ſkin, or the weather: for, when it is very hot, they put in freſh lime twice a week; but, when it is froſty, they ſometimes do not touch them for three months. Every freſh lime-pit they throw them into is ſtronger and ſtronger. At four, five, or ſix weeks end, the tanner ſcrapes off the hair on a wooden block, with a kind of knife for that purpoſe. And, when it is entirely cleanſed from the hair, he carries it to a river to waſh, pares off the fleſh on the block with a kind of paring-knife, and rubs it briſkly with a kind of whet-ſtone, to take off any remains of fleſh or filth on the hair ſide. The ſkin is now put into tan, that is, covered over with tan, as it is ſtretched in the pit, and the water let in upon it. If the ſkin be ſtrong, five coverings of tan will be required; for weaker, three or four may ſuffice. When the ſkin has not been kept long enough in lime, or the pan-pit upon clearing it, in the middle of it is ſeen a whitiſh ſtreak, called the horn, or crudity of the ſkin: and this is the reaſon why the ſoals of ſhoes, &c. ſtretch ſo eaſily, and let in water.

When the hides are ſufficiently tanned, they are taken out of the pits to be dried, by hanging in the air. Then the tan is cleanſed off them, and they are put in a place neither too dry nor too moiſt; they are well ſtretched over each other, with weights a-top to keep them tight and ſtraight; and in this condition are ſold under the name of bend leather. Cows, calves, and horſes ſkins, are tanned much after the ſame manner as thoſe of oxen, except that the former are only kept four months in the lime-pit; and, before they are put into the tan-pit, they are previouſly immerſed in the following preparation: cold water is poured into a wooden fat or tub, wherein the ſkins are put, which are kept ſtirring, while more water is warming in a copper, and, as ſoon as that water is a little more than lukewarm, it is poured gently into the fat, and upon this is caſt a baſket of tan; during which time the ſkins are ſtill kept turning, that the water and tan may not ſcorch them. After an hour they are taken out, and caſt for a day in cold water, then returned into the former fat, and the ſame water they had been in before; and here they had been left eight days; which expired, they are put into the tan-pit, and three coverings of tan given them; the firſt of which laſts five weeks, the ſecond ſix, and the third two months. The reſt of the proceſs is in all reſpects the ſame as that above delivered. In ſome countries, as Champagne, &c. the tanner gives the firſt preparation with barley, inſtead of lime.

By Mr. de Buffon's experiments upon different ſkins, it was found that a decoction of young oak wood ſucceeded perfectly well in tanning ſheep and calves ſkins, but did not do equally well for ox, and the other harder ſkins. This, however, he imagines might be only for want of knowing the beſt method of uſing the wood. And, certainly, theſe trials deſerve to be further proſecuted; ſince the ſmall branches of the oak, which are of little value, might be thus made to ſupply the place of a much dearer commodity, the bark; and, as in many trees, the bark of the young branches is found to be of greatly more virtue than that of the larger branches, or the trunk, the uſe of theſe ſmall boughs, bark and all, might very probably be found to anſwer to all the effects of the bark, of the larger kind alone.

The ſaw-duſt of the oak has alſo been found, by ſeveral experiments made before the Society of Arts, &c. to anſwer full as well as the bark itſelf.

TANTALUS's Cup, in hydraulicks, a ſiphon ſo adapted to a cup, that the long leg may go down through the bottom of the cup.

This bended ſiphon is called Tantalus's cup, from the reſemblance of the experiment made with an image in the glaſs, repreſenting Tantalus in the fable, fixed up in the middle of the cup with a ſiphon concealed in his body, beginning in the bottom of his feet, and aſcending to the upper part of his breaſt; there it makes a turn, and deſcends through the other leg, on which he ſtands; and from thence through the bottom of the cup, where it runs out, and cauſes the water to ſubſide in the cup: as ſoon as it riſes to the height of the ſiphon, or to the chin of the image, which is above S *s*, (*plate* LXXVII. *fig.* 2.) the water will begin to run through the ſiphon concealed in the figure, till the cup is emptied in the manner explained under Siphon, and repreſented more diſtinctly in *fig.* 3.

Sometimes the Tantalus's cup is made without a figure fixed in it, (as *fig.* 4.) where the water being up at S *s*, the cup does not run; but as ſoon as the figure, or an apple, or orange, &c. is thrown in, the water begins to run out at the foot of the cup, and does not ceaſe till the whole cup is empty. This happens becauſe the body thrown into the cup, raiſes the water's ſurface from S *s* to B C, where being above the upper end S of the pipe S P concealed in the handle, which thereby is made a ſiphon, the water which is come into the handle at O runs into the middle pipe at S, and ſo out at P, under the foot, ſo long as there is any water above O.

TAPESTRY, a curious kind of manufacture, ſerving to adorn a chamber or other apartment, by hanging or covering the walls thereof. It is a kind of woven hangings, of wool and ſilk frequently raiſed and enriched with gold and ſilver, repreſenting figures of men, animals, landſkips, hiſtories, &c. The invention of tapeſtry ſeems to have come to us from the Levant, and this ſeems the more probable, in that the workmen concerned in it were called, at leaſt in France, ſarraſins, or ſarraſinois. It is ſuppoſed that the Engliſh and Flemiſh, who were the firſt that excelled in making tapeſtry, might bring the art with them from ſome of the croiſades or expeditions againſt the Sarraſins.

TAPPING, in agriculture, is the making an inciſion in the bark of a tree, and letting out the juice. To tap a tree at the root, is to open it round about the root. Ratray, the learned Scot, affirms, that he has found by experiment, that the liquor which may be drawn from the birch, in the ſpring time, is equal to the whole weight of the tree, branches, roots, and all together.

TAR, a thick, black, reſinous, very adheſive juice, melted out by fire from old pines and fir-trees. The trees, cut in pieces, are incloſed in a large oven, which being heated by a fire on the outſide, or the wood itſelf kindled and ſmothered, the juice runs off by a canal at the bottom. Tar differs from the turpentine or native reſinous juice of the trees in having received a diſagreeable empyreumatick impreſſion from the fire; and in containing, along with the pungent bitter terebinthinate matter, a portion of the acid which is extricated from the wood by the heat, and likewiſe of its gummy or mucilaginous matter.

TARANTISMUS, in medicine, the diſeaſe or affection of thoſe bit by the tarantula.

TARANTULA, in natural hiſtory, a ſpider of Apulia of the octonocular kind, or which has eight eyes, and ſpins webs; it has eight legs, four on each ſide, and in each leg three joints; from the mouth proceed two darts in ſhape like a hooked forceps, or crab's claw; theſe are ſolid and very ſharp, ſo that they can eaſily pierce the ſkin; and, between theſe and the fore legs, there are two

little

little horns, which anſwer to thoſe bodies, called, from their uſe in flies, the feelers; becauſe, as they do ſo, this creature is obſerved to move them very briſkly when it approaches to its prey. (See *plate* IX. *fig.* 12. vol. 1.)

This, like other ſpiders, propagates its ſpecies by laying eggs, which are very numerous, ſo that there are found ſometimes in the female, when diſſected, an hundred or more; and theſe are hatched partly by the heat of the mother, and partly by that of the ſun, in about 20 or 30 days time.

There is alſo a ſpider of the like nature with the tarantula in the W. Indies, which Francis Hernandez deſcribes by the name of hoitztocatl, or the pricking ſpider, and ſays that its bite induces madneſs.

It is ſaid, that in the ſummer months, when the heats are greateſt, as in the dog-days, the tarantula, creeping among the corn in the fields, bites the mowers and paſſengers; and that its poiſon produces a ſpecies of madneſs which can only be cured by muſick.

But, notwithſtanding all this, there is good reaſon to believe the whole ſtory fabulous, and a vulgar error; for it is treated as ſuch by an Italian phyſician, in the Philoſ. Tranſ. and a great many gentlemen of unqueſtionable veracity, who reſided at Taranto many months, and during the time in which the bite of a tarantula is ſaid to be moſt pernicious, affirm, that there was not a phyſician in the country, who believed there ever was ſuch a diſtemper, from ſuch a cauſe: that among the vulgar there is a tradition, that diſtempers attended with very extraordinary circumſtances, had been excited by the bite of a tarantula; but that no body every remembers a ſingle inſtance; and that there is no other ſpider to be found in that country, different from thoſe which are common in moſt warm countries.

TARE and Tret, in commerce, any defect, waſte, or diminution in the weight, the quantity, or the quality of goods.

Tare is more particularly uſed for abatement, or deduction in the price of a commodity, on account of the weight of cheſts, caſks, bags, frails, &c.

TARGET, a ſhield, thus called from the Latin, targum, back, becauſe originally made of leather, wrought out of the back of an ox's hide.

TARGUM, in the ſacred literature, a name which the Jews give to their Chaldee gloſſes, and paraphraſes on the ſcripture.

TARIF, or Tarrif, a book of rates, a table or catalogue drawn uſually in alphabetical order, containing the names of ſeveral kinds of merchandize, with the duties or cuſtoms to be paid for the ſame as ſettled by authority, and agreed on between the ſeveral princes and ſtates that hold commerce together.

TARNISHING, a diminution of the natural luſtre of any thing, eſpecially a metal. Gold and ſilver, when tarniſhed, reſume their brightneſs by ſetting them over the fire with certain lies. Copper and pewter, &c. that are tarniſhed, recover their luſtre with tripoli and potaſhes.

TARPAULIN, or Tarpawling, a piece of canvas well pitched and tarred over to keep off the rain or ſalt-water from any place. The term is alſo uſed in deriſion to a perſon bred at ſea, and educated in the mariner's art.

TARRACE, Tarrass, or Terrace, a coarſe ſort of plaſter or mortar, durable in the water, chiefly uſed to line baſons, ciſterns, wells, and other reſervoirs of water.

TARSUS, in anatomy, is the ſpace between the bones of the leg and the metatarſus, conſiſting of ſeven bones, viz. the aſtragalus or talus, calcaneum, naviculare, three oſſa cuneiformia, and the cubiforme; which ſee under thoſe articles.

Tarsus is alſo a name given, by ſome anatomiſts, to the cartilages which terminate the palpebræ, or eyelids, and from which the cilia or hairs ariſe.

They are exceedingly thin and fine, which makes them light and flexible. Their form is ſemi-circular; that of the upper eye-lid is ſomewhat longer than that of the under: they ſerve alike to cloſe the eyes.

TARTANE, a kind of bark uſed for fiſhing and carriage: they are fluſh fore and aft, and commonly uſe oars. They are plenty in the Mediterranean: they have only a main-maſt and a mizen: their ſails are triangular. When they put up a ſquare ſail, it is called a ſail of fortune.

TARTAR, in natural hiſtory, a hard and almoſt ſtony ſeparation from a vegetable juice after fermentation.

It is the produce of wine, and is found adhering, in large maſſes, to the bottoms and ſides of caſks, in which that liquor has been long kept. We meet with it in large maſſes of an irregular figure, and more or leſs denſe texture; without ſmell, and of a ſub-acid taſte.

The common crude tartar is of two kinds, the white and the red; this difference of colour, being owing to that of the wine they are produced from, is of little conſequence in itſelf, but it is an indication of more eſſential differences in the matter. The white tartar is much more pure and clear than the red, and is, though equally hard, conſiderably leſs heavy. We have this principally from Germany, where it is, at times, cleared off from the ſides of very large veſſels, in which they keep their white wines for many years. The red tartar is brought in large quantities from Italy, and ſome parts of France. The white tartar is to be choſen for medicinal uſe, and particularly ſuch as is of a compact texture, not ſpongy or cavernous, when broken, and free from dirt or other foulneſſes, and ſuch as has a ſort of cryſtallization on its ſurface.

Tartar is, properly ſpeaking, the eſſential ſalt of the grape. The ancients made no diſtinction between tartar and the lees of wine. In truth, the lees of wine, and tartar, have both the ſame origin, and differ very little. Wine, after due fermentation, and when put up in veſſels, depoſits two ſubſtances; the one ſinks to the bottom of the veſſel, and is thick, foul, and muddy, but ſtill, in ſome degree, fluid; this is, properly, what we know by the name of wine-lees: the other ſeparated matter is ſolid and hard; it adheres to the ſide of the veſſel, and even to the bottom itſelf under this liquid matter, and forms a thick cruſt, which ſticks to it in the ſame manner as the cruſt of ſparry matter adheres to the inſide of our veſſels, in which water is frequently boiled. This ſolid matter is tartar. Tartar contains but little of the ſpirituous part of the liquor from which it was formed; but the lees of wine, on the other hand, abound with ſpirit; they even contain more, and yield more of it, by diſtillation, than the wine itſelf.

Tartar contains a large portion of acid ſalt, and of an oil, in part thin and limpid, in part thick and coarſe. It affords a ſmall portion of a volatile alkali ſalt, in diſtillation, and the reſiduum yields a very large proportion of fixed alkali. It is to be obſerved, that both theſe alkalies ſeem, in ſome degree, creatures of the fire; for neither of them manifeſt themſelves either by their taſte or qualities in the tartar, any more than in many other ſubſtances, which yet afford much of them by analyſis, till they have felt the operation of the fire.

Tartar diſſolves in boiling water, but with great difficulty in cold; and even when purified, and brought to the ſtate of what we call cryſtals, or cream of tartar, it retains the ſame quality. Tartar is ſcarce ever given internally in its crude ſtate.

TASTE, ſavour, a ſenſation excited in the ſoul, by means of the organs of taſte, viz. the papillæ of the tongue, &c.

Taste, is alſo uſed in a figurative ſenſe, for the judgment and diſcernment of the mind. We conſtantly hear talk of good and bad taſte, without well underſtanding the meaning of theſe terms: in effect, a good taſte ſeems, at bottom, to be little elſe but right reaſon, which we otherwiſe expreſs by the word judgment.

Mad. Scudery and Mad. Dacier call good taſte a harmony between the mind and reaſon; and according as that harmony is more or leſs juſt, the perſon has more or leſs of this taſte.

TASTING, the ſenſe whereby we diſtinguiſh favours; or the perception which the ſoul has of external objects, by means of the organs of taſte.

TAT-TOO, q. d. Tap-to, a beat of a drum at night to advertiſe the ſoldiers to retreat or repair to their quarters in their garriſon, or to their tents in a camp.

TAU, or Taw, in heraldry, an ordinary in figure of a T, ſuppoſed to repreſent St. Andrew's croſs, or a croſs patent, the top part cut off.

TAURUS, in aſtronomy, the bull; one of the 12 ſigns of the zodiack, and the ſecond in order, and is thus characteriſed, ♉. (See *plate* IV. *fig.* 2.)

The stars in the constellation Taurus, in Ptolemy's catalogue, are 44; in Tycho's catalogue, 41; in the Britannick catalogue, 135.

TAUTOLOGICAL ECHOES, are such echoes as repeat the same sound or syllable many times.

TAUTOLOGY, in grammar, a needless repetition of the same thing in different words.

TAWING, the art or manner of preparing or dressing skins in white, to fit them for use in divers manufactures, particularly gloves, purses, &c. All kinds of skins may be tawed; but it is chiefly those of sheep, lambs, kids, and goats, that are used to be dressed this way, as being those fittest for gloves.

TAX, a tribute settled on every town after a certain rate, and paid yearly towards the expences of the government.

TAX also denotes the tribute which tenants were occasionally to pay their lord.

TAXERS, two officers annually chosen, in Cambridge, to see the true gauge of all weights and measures observed.

TAXIS, in ancient architecture, signifies the same with ordonnance in the new, and is described, by Vitruvius, to that which gives part of a building its just dimensions with regard to its use.

TEA, or THEA, the leaf of a shrub, growing in several provinces in China, Japan, and Siam.

The people who deal in tea, distinguish a vast many kinds of it, as they differ in colour, flavour, and in size of the leaf. These are all, however, the leaves of the same tree, only differing according to the seasons at which they are gathered, and the manner of their drying. To enumerate these several sub-distinctions were endless, the general division is into three kinds: the ordinary green tea, the finer green tea, and the bohea; to one or other of these all the other kinds may be referred.

The preparation and use of tea as a dietetick liquor, are in general well known. With regard to its medical effects, some have excessively extolled, and others as extravagantly condemned it. Tea is in many cases a very useful liquor; a grateful diluent in health, and a salutary drink in sickness: it attenuates viscid juices, promotes the natural excretions, excites appetite, and proves serviceable particularly in fevers, in immoderate sleepiness, after a debauch, and in head-achs arising from that cause; no other plant is known, whose infusion passes off more freely by the emunctories of the body, or more speedily excites the spirits. It is not, however, without its inconveniences: in habitual colicks it is found to do harm, and in urinary obstructions it should be sparingly drank: its immoderate use is productive of cacochymick, cachectick, chlorotick disorders, and weakens the tone of the stomach and nervous system. It is said, when new, to be narcotick, and to disorder the senses; but to lose this quality, in great part by the exsiccation, and totally by being kept for a year: in the tea countries, it is a principal caution to abstain from it till this period, but in Europe there is no danger of its being used too new.

TEARS, *Lachrymæ*, a watery humour issuing out at the corners of the eye by the compression of the muscles, serving to moisten the cornea, to express our grief, and even to alleviate it.

TEAZEL, or TEASEL, *Carduus Fullonum*, or the fuller's thistle, a kind of plant much used by the fullers, cloth-workers, and stocking-weavers, to card or draw out the wool or nap from the thread or ground of several kinds of cloth, stuffs, stockings, &c. in order to render them closer and warmer. See DIPSACUS.

TEBETH, the tenth month of the Jewish ecclesiastical year, and fourth of the civil. It answers to our month of December.

TECHNICAL, *Technicus*, something that relates to art. In this sense we may say technical words, technical verses, &c.

TECHNICAL is more particularly applied to a kind of verses, wherein are contained the rules and precepts of any art thus digested, to help the memory to retain them.

TECHNICAL *Words*, are what we otherwise call terms of art.

TEETH, *Dentes*, in anatomy. See TOOTH.

TEINTS, and *Semi*-TEINTS, in painting, denote the several colours used in a picture, considered as more or less high or bright, deep or thin, or weakened and diminished, &c. to give the proper relievo, or softness, or distance, &c. to the several objects.

TELAMON, or ATLAS, a name given to those figures or half figures of men so commonly used instead of columns or pilasters, to support any member in architecture, as a balcony, or the like.

TELAMONES, a name given by the Romans to what the Greeks call Atlantes, viz. the figures of men supporting entablatures and other projectures.

TELESCOPE, an optical instrument, composed of lenses, by means of which, remote objects appear as if nigh at hand. That the telescope is of modern invention is most certain; neither does it appear that microscopes, or optick glasses of any kind, were known to the ancients.

It is contended, that Alexander de Spina, a native of Pisa, was the first that made the use of glasses known to the world; but our countryman, Friar Bacon, who died 21 years before him, was, in all probability, acquainted with them first; for he wrote a book of perspective, in which he plainly shews that he did not only understand the nature of convex and concave glasses, but the use of them when combined in telescopes; though he no where, in that treatise, discovers the manner in which they are to be put together.

The telescope with the concave eye-glass, was first invented by a mechanick of Middleburgh, in Zeland, called Z. Johannides, about the year 1590, though J. Lipperhoy, another Dutchman, is candidate for the same discovery. From whence, this sort of telescope is called tubus Batavus.

Franciscus Fontana, a Neapolitan, contends, that he was the first contriver of the telescope composed of two convex glasses, which is now the common astronomical telescope; and Rheita pretends to be the first that rendered that telescope fit for terrestrial uses, by adding two eye-glasses to it.

The telescope is of two sorts, viz. dioptrick, or refracting; or cata-dioptrick, by reflection and refraction conjointly. A refracting telescope consists of an object-glass xz (*Plate* LXXVI. *fig.* 1.) by which the image fd of an object O B, at a distance, is formed in the focus e of the said glass, and in an inverted position. This image may be viewed by a single lens, ab, placed at its focal distance, as is usually done for viewing the heavenly bodies, because in them we do not regard the position: but for viewing objects near us, whose image we would have erect, we must, for that purpose, add a second lens pq, at double its focal distance from the other, that the rays which come from ab, may cross each other in the focus o, in order to erect the image gn, which it will form in its own focus m, because the rays come parallel from the first lens ab. Lastly, a third lens ic is added, to view the secondary image gn. These three lenses, or eye-glasses, are usually of the same size and focal length; and the power of magnifying is always as the focal length of the object-glass ew divided by the focal length of the eye-glass lm or he. For instance: Suppose $ew = 10$ feet or 120 inches, and he or $lm = 3$ inches; then will the object appear to the eye, through such a telescope, forty times bigger than to the naked eye; and its surface will be magnified 1600 times, and its bulk or solidity 6400 times.

If instead of a convex eye-glass we should use a concave one of the same focal length, it would represent the object erect, equally magnified, and more distinct and bright; but the disadvantage of this glass is, that it admits but a small area, or field of view, and, therefore, not to be used when we would see much of an object, or take in a great scope; but it is used to great advantage in viewing the planets and their satellites, Saturn's ring, Jupiter's belts, &c.

There is a defect in all telescopes of this kind, not to be remedied by any means whatever, which was thought only to arise from hence, viz. that spherical glasses do not collect rays to one and the same point; but it was happily discovered by Sir Isaac Newton, that the imperfection of this sort of telescope, so far as it rises from the spherical form of the glasses, bears almost no proportion to that which is owing to the different refrangibility of light. This diversity in the refraction of rays is about a twenty-eighth part of the whole, so that the object-glass of a telescope cannot collect the rays which flow from any one point in the object into a less room than the circular

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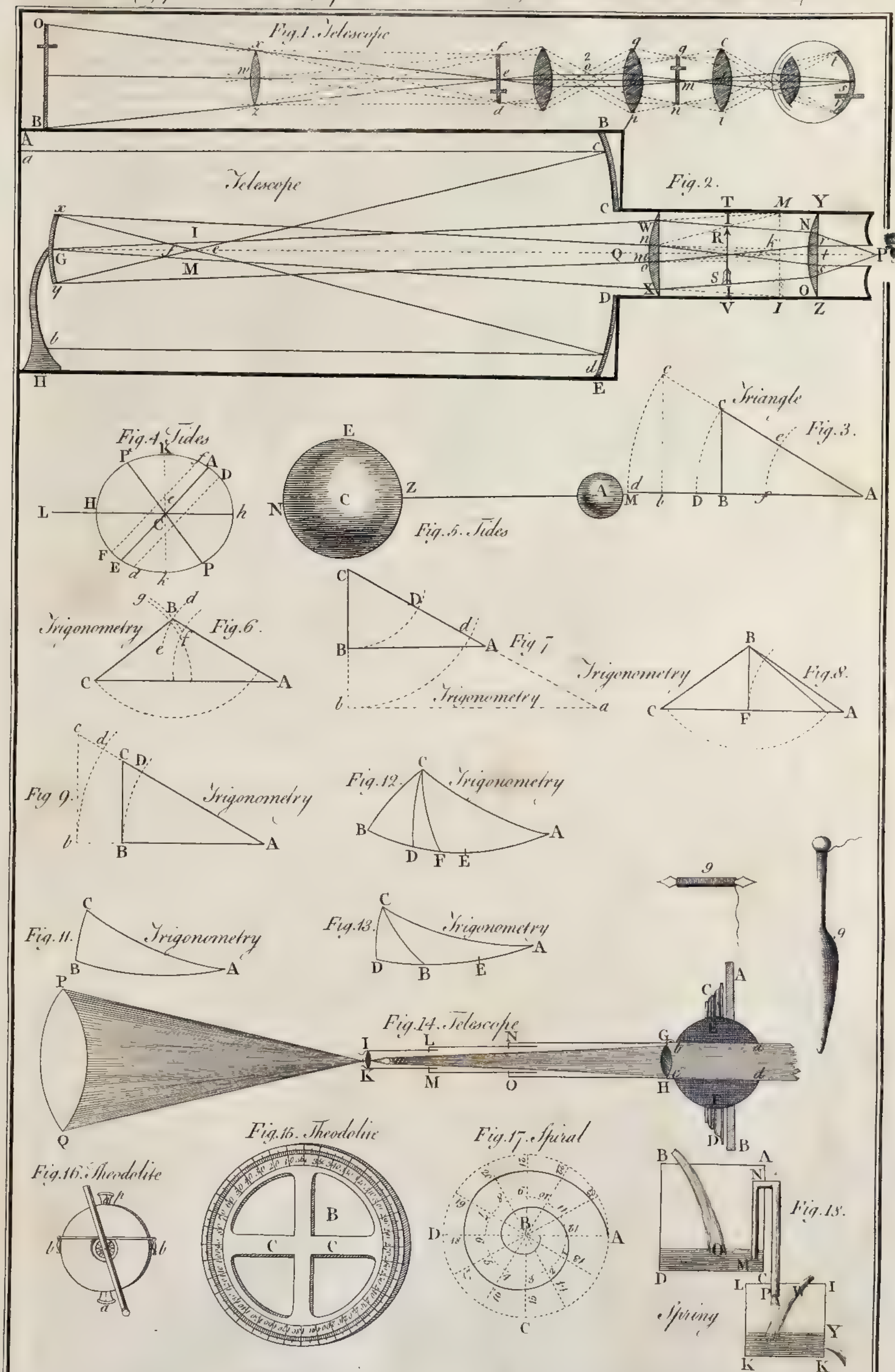


cular ſpace, whoſe diameter is about the fifty-ſixth part of the breadth of the glaſs. Therefore, ſince each point of the object will be repreſented in ſo large a ſpace, and the centres of thoſe ſpaces will be contiguous, becauſe the points in the object the rays flow from are ſo, it is evident that the image of an object made by ſuch a glaſs muſt be a moſt confuſed repreſentation, though it does not appear ſo when viewed through an eye-glaſs that magnifies in a moderate degree; conſequently, the degree of magnifying in the eye-glaſs muſt not be too great with reſpect to that of the object-glaſs, leſt the confuſion become ſenſible.

Notwithſtanding this imperfection, a dioptrical teleſcope may be made to magnify in any given degree, provided it be of ſufficient length; for, the greater the focal diſtance of the object-glaſs is, the leſs may be the proportion which the focal diſtance of the eye-glaſs may bear to that of the object-glaſs, without rendering the image obſcure. Thus, an object-glaſs, whoſe focal diſtance is about four feet, will admit of an eye-glaſs whoſe focal diſtance ſhall be little more than one inch, and, conſequently, will magnify almoſt 48 times: but an object-glaſs of 40 feet focus will admit of an eye-glaſs of only four inch focus, and will, therefore, magnify 120 times; and an object-glaſs of 100 feet focus will admit of an eye-glaſs of little more than ſix inch focus, and will therefore magnify almoſt 200 times.

Catadioptrick, or *reflecting* TELESCOPE, is the moſt noble and uſeful of all others; the mechaniſm of which is as follows:

A B E H (*Plate* LXXVI. *fig.* 2.) is the large tube, or body of the inſtrument, in which B E is a large reflecting mirrour, with a hole in the middle C D. This mirrour receives the rays *a c*, *b d*, coming from the object at a diſtance, and reflects them converging to its focus *e*, where they croſs each other, and form the inverted image I M; *x y* is a ſmall concave mirrour, whoſe focus is at *f*, at a ſmall diſtance from the image. By this means the rays coming from the image are reflected back through the central hole C D of the large mirrour, where they fall on the plano-convex lens W X, and are by it converged to a focus, and there form a ſecond image R S, very large and erect, which is viewed by a meniſcus eye-glaſs Y Z, by the eye at P, through a very ſmall hole in the end of the eye-piece Y C D Z.

If the firſt lens W X were taken away, the image would be formed ſomewhat larger at *M I*; but the area or ſcope would be leſs, and therefore the view not ſo pleaſant. At T V is placed a circular piece of braſs, with a hole of a proper ſize to circumſcribe the image, and cut off all ſuperfluous or extraneous rays, that ſo the object may appear as diſtinct as poſſible.

As the image is formed by reflection, the rays of every ſort will be united nearly in one point, and will therefore admit of an eye-glaſs Y Z of a deep charge, or ſmall focal diſtance; and ſo the power of magnifying will be proportionally increaſed.

Such is the teleſcope firſt contrived by Dr. J. Gregory, and therefore called the Gregorian teleſcope; but it received its laſt improvement from the late Mr. Hadley, and is now in common uſe.

Aeriel TELESCOPE, is a dioptrick teleſcope, uſed without a tube, in a dark night; for the uſe of the tube is not only to direct the glaſſes, but alſo to make the place dark where the images of objects are formed.

Huygenius contrived a teleſcope of this kind for viewing the celeſtial bodies, by fixing the object glaſs on the top of a long upright pole, and directing its axis towards any object by means of a ſilk line coming from the object-glaſs to the eye-glaſs below. In this manner were teleſcopes made of 123 feet.

Solar TELESCOPE. This inſtrument is applied to uſe in the following manner: A B (*Plate* LXXVI. *fig.* 14.) repreſents a part of the window ſhutter of a darkened room, C D the frame, which, by means of a ſcrew, contains the ſcioptrick ball E F, placed in a hole of the ſaid ſhutter adapted to its ſize. This ball is perforated with a hole *a b c d* through the middle; on the ſide *b c* is ſcrewed into the ſaid hole a piece of wood, and in that is ſcrewed the end of a common refracting teleſcope G H, I K, with its object glaſs G H, and one eye-glaſs at I K; and the tube is drawn out to ſuch a length, as that the focus of each glaſs may fall near the ſame point.

This being done, the teleſcope and ball are moved about in ſuch a manner as to receive the ſun beams perpendicularly on the lens G H, through the cylindrick hole of the ball; by this glaſs they will be collected all in one circular ſpot *m*, which is the image of the ſun. The lens I K is to be moved nearer to or farther from the ſaid image *m*, as the diſtance at which the ſecondary image of the ſun is to be formed requires, which is done by ſliding the tube I K L M backwards and forwards in the tube L M N O. Then on the firſt image of the ſun *m* will be formed a ſecond image P Q, very large, luminous, and diſtinct.

In this manner the ſun's face is viewed at any time, without offence to weak eyes; and whatever changes happen therein may be duly obſerved. The ſpots, which make ſo rare an appearance to the naked eye, or through a ſmall teleſcope in the common way, are here all of them conſpicuous, and eaſy to be obſerved under all their circumſtances of beginning to appear, increaſe, diviſion of one into many, the uniting of many into one, the magnitude, decreaſe, abolition, diſappearance behind the ſun's diſk, &c.

By the ſolar teleſcope, we alſo view an eclipſe of the ſun to the beſt advantage, as having it in our power by this means to repreſent the ſun's face or diſk as large as we pleaſe, and conſequently the eclipſe proportionably conſpicuous. Alſo the circle of the ſun's diſk may be ſo divided by lines and circles drawn thereon, that the quantity of the eclipſe eſtimated in digits, may this way be moſt exactly determined; alſo the moments of the beginning, middle, and end thereof, for finding the longitude of the place, with ſeveral other things relating thereto.

The tranſits of Mercury and Venus over the face of the ſun, are exhibited moſt delightfully by this inſtrument. They will appear here truly round, well defined, and very black; their comparative diameters to that of the ſun may this way be obſerved, the direction of their motion, the times of their ingreſs and egreſs, with other particulars for determining the parallax and diſtance of the ſun, more nicely than has hitherto been done.

By the ſolar teleſcope, you ſee the clouds moſt beautifully paſs before the face of the ſun, exhibiting a curious ſpectacle according to their various degrees of rarity and denſity. But the beautiful colours of the clouds ſurrounding the ſun, and refracting his rays, are beſt ſeen in the picture made by the camera-glaſs.

The fine azure of the ſky, the intenſely ſtrong and various dyes of the margins of clouds, the halo's and corona's, are this way inimitably expreſſed. And ſince the priſmatick colours of clouds, ſo variouſly compounded here, make ſo noble and delightful a phænomenon, it is ſurpriſing that no more regard is had thereto by painters, whoſe clouds, though near the ſun, are ſeldom or never ſeen tinged or variegated with thoſe natural tints and colours.

TELESCOPICAL STARS, ſuch as are not viſible to the naked eye, but diſcoverable only by the help of a teleſcope.

TELLER, an officer in the Exchequer, of which there are four, whoſe buſineſs is to receive all monies due to the crown, and thereupon to throw down a bill through a pipe into the tally court; where it is received by the auditor's clerks, who attend there to write the words of the ſaid bill upon a tally, and then deliver it to be entered by the clerk of the pells, or his clerk.

The tally is then ſplit or cloven by the two deputy chamberlains who have their ſeals, and whilſt the ſenior deputy reads the one part, the junior examines the other part with the other two clerks.

TEMPERAMENT, *Temperamentum*, *Temperamenture*, in phyſicks, that habitude or diſpoſition of body ariſing from the proportion of the four primary elementary qualities it is compoſed of, and is that diverſity in the blood of different perſons whereby it is more apt to fall into ſome certain combinations in one body than another, whether into cholar, phlegm, &c. From whence perſons are ſaid to be of a bilious or phlegmatick temperament, or the like.

TEMPERAMENT, *Temperamento*, in muſick, denotes a rectifying or mending the falſe and imperfect concords by transferring to them part of the beauty of the perfect ones.

TEMPERATE ZONE; ſee the article ZONE.

TEMPERING, in the mechanick arts, the preparing of ſteel and iron, ſo as to render them more compact, hard,

hard, and firm, or even more soft and pliant, according to the respective occasions.

To harden and temper English, Flemish, and Swedish steel, they must have a pretty high heat given them, and then be suddenly quenched in water to make them hard; but Spanish and Venetian steel will require no more than a blood-red heat before it is quenched.

If the steel be too hard or brittle for an edged tool, &c. take it down by rubbing a piece of grind-stone or whet-stone hard upon the work, to take off the black scurf; then brighten or heat it in the fire, and as it grows hotter, you will see the colour change by degrees, coming first to a straw or light gold colour, then to a darker gold-colour, and at last to a blue colour.

Choose such of these colours as the work requires, then quench it suddenly in the water. The light gold-colour is for files, cold chissels, and punches to punch iron and steel: the dark gold-colour, for punches to use on brass, &c. and the blue-colour gives the temper for springs. The tempering of files and needles is performed after a peculiar manner.

TEMPLARS, or Templers, a religious order instituted at Jerusalem about the year 1118. Some religious gentlemen put themselves under the government of the patriarch of Jerusalem, renounced property, made the vow of celebacy and obedience, and lived like cannons regular. King Baldwin assigned them an apartment in his palace. They had likewise lands given them by the king, the patriarch, and the nobility for their maintenance. This order after having performed many great exploits against the infidels, became rich and powerful all over Europe; but the knights abusing their wealth and credit, fell into great disorders and irregularities. Many crimes and enormities being alledged against them, they were prosecuted in France, Italy, and Spain; and at last the pope, by his bull of the 22d of May, 1312, given in the council of Vienna, pronounced the extinction of the order of templars, and united their estates to the order of St. John of Jerusalem.

TEMPLE, *Templum*, a publick building erected in honour of some deity, either true or false, and wherein the people meet to pay religious worship to the same.

Temples, among us, denote two inns of court, thus called, because formerly the dwelling-house of the knights templars.

Temples, *Tempora*, in anatomy, a double part of the head, reaching from the forehead and eyes to the two ears.

TEMPORALIS, in anatomy, a muscle which arises from a semi-circular fleshy beginning, from a part of the os frontis, the lower part of the parietale, and upper part of the temporale; from whence going under the zygoma, and gathering together as in a centre, it is inserted in a short and strong tendon into the processus coronæ of the lower jaw which it pulls upwards.

TEMPORALITIES, or Temporalties, the temporal revenues of an ecclesiastick; particularly such lands, tenements, or lay fees, tythes, &c. as have been annexed to bishops fees, by our kings, or other persons of high rank in the kingdom.

TEMPORIS Os, in anatomy, a bone on each side the head, thus denominated from its situation in the temples. The figure of the os temporis is nearly circular; the fore and upper parts are very thin, consisting only of one table; the lower and higher parts are thick, hard, and uneven.

TENABLE, in the military art, something that may be defended, kept, and held against assailants.

Tenable is little used, but with a negative; when a place is open on all sides, and its defences all beaten down, it is no longer tenable. When the enemy has gained such an eminence, this post is not tenable.

TENAILLE, in fortification, a kind of outwork, consisting of two parallel sides with a front wherein is a re-entering angle. In strictness that angle and the faces which compose it, are the tenaille.

TENANT, or Tenent, in law, one that holds or possesses lands or tenements of some lord or landlord, by any kind of right, either in fee, for life, years, or at will.

TENDER, in a legal sense, signifies as much as to offer or endeavour the performance of any thing, in order to save the penalty or forfeiture incurred by non performance.

Tenders, in the sea language, are vessels employed to raise seamen for the navy, commanded by a lieutenant of one of his majesty's ships; they likewise attend large ships, and carry stores, &c.

TENDON, *Tendo*, in anatomy, that hard, white, extreme part of a muscle, whereby it is fastened to the bone. See Muscle.

TENEMENT, *Tenacy*, in law, a house or lands depending on a manor or lordship; or a fee or farm, held of a superior lord, and which he may recal when the term or condition is expired.

Frank Tenement, is any lands, house, office, or the like, wherein a man has estate for life, or in fee.

Base Tenement, is where a man holds lands, &c. at the will of the lord.

TENEMENTIS Legatis, in law, a writ which lies in London, and other places where the custom is to devise tenements by last will, as well as personal goods and chattels, for the hearing any cause relating thereto.

TENESMUS, in medicine, is a too frequent, and almost continual, though ineffectual desire of going to stool, since either nothing at all, or only a small quantity of mucous, viscid, bloody, or purulent matter is discharged.

This disorder may be produced by a dysentery, except when it is accompanied with an ulcer of the intestinum rectum. A tenesmus is generally less dangerous than a dysentery. In this disorder great relief is afforded by a fomentation of warm milk, in which elder flowers have been boiled; as also by a clyster of mutton broth, or an emollient clyster, in which earth-worms have been boiled.

TENET, or Tenent, a particular opinion, dogma, or doctrine, professedly held by some divine, philosopher, &c.

TENNE, Tenny, or Tawny, in heraldry, a bright colour made of red and yellow mixed, sometimes also called brusk, and expressed in engraving by thwart or diagonal strokes or hatches, beginning from the sinister chief, like purpure.

TENON, in building, &c. the square end of a piece of wood or metal diminished by one third of its thickness, to be received into a hole in another piece called the mortoise, for the joining or fastening the two together.

TENOR, or Tenour, the purport or contents of a writing or instrument in law.

Tenor, *Tenore*, in musick, the first mean or middle part; or that which is the ordinary pitch or tenour of the voice, when not either raised to the treble, or lowered to the bass.

TENSE, *Time*, in grammar, an inflexion of verbs, whereby they are made to signify or distinguish the circumstance of time of the thing they affirm or attribute.

There are but three simple tenses; the present, as I love, *amo*; the preter, preterit, or past, as I have loved, *amavi*; and the future, as I will love, *amabo*.

TENSION, *Tensio*, the state of a thing bent, or the effort made to bend it.

Animals only sustain and move themselves by the tension of their muscles and nerves. A chord or string gives an acuter or deeper sound, as it is in a greater or less degree of tension.

TENT, a pavillion or portable lodge.

Tent, *Turunda*, in chirurgery, is a roll of lint made in a particular form, put into wounds whose suppuration is not perfect, or where there is a quantity of matter contained in the tumour, more than what comes out at the first dressing, &c.

TENTATIVE, something used adjectively; thus we say, a tentative method, meaning a kind of unartful or indirect method which only proceeds by trying.

Tentative is also used substantively, for an essay, or effort, whereby we try our strength, or sound an affair, &c. to see whether or no it will succeed.

TENTER, Trier, or Prover, a machine used in the cloth manufactory, to stretch out the pieces of cloth, stuff, &c. or only to make them even and set them square.

TENURE, *Tenura*, in law, the manner or condition wherein a tenant holds lands or tenements of his lord; or the services performed to the lord, in consideration of the use and occupancy of his lands.

TEREBINTHINA, in medicine, natural history, &c. See Turpentine.

TERES, in anatomy, a name given to two muscles of

of the arms, called alſo rotundi; diſtinguiſhed by major and minor.

Teres, or *Rotundus Major*, ariſes from the lower angle of the baſis of the ſcapula, and aſcending obliquely upwards in a round ſmooth body, under the head of the longus, is inſerted with a ſhort flat tendon below the os humeri.

TERGIFŒTOUS Plants, ſuch as bear their ſeeds on the backſides of their leaves.

TERM, *Terminus*, the extreme of any thing, or that which bounds and limits its extent.

Term, in geometry, is ſometimes uſed for a point, ſometimes for a line, &c. A line is the term of a ſuperficies, and a ſuperficies of a ſolid.

Term, in law, ſignifies a boundary or limitation of time or eſtate.

TERMS, Termes, Termini, in architecture, denotes a kind of ſtatues or columns adorned at top with the figure of a man's, woman's, or ſatyr's head as a capital; and the lower part ending in a kind of ſheath or ſcabbard.

Milliary Terms, *Termini Milliories*, among the ancient Greeks, were the heads of certain divinities, placed on ſquare land-marks of ſtone, or on a kind of ſheath to mark the ſeveral ſtadia, &c. in the roads. Theſe are what Plautus calls lares viales.

Terms, are alſo uſed for the ſeveral times or ſeaſons of the year, wherein the tribunals, or courſe of courts of judicature, are open to all who think fit to complain of wrong, or to ſeek their own by due courſe of law, or action. In contradiſtinction to thoſe, the reſt of the year is called vacation. Of theſe terms there are four in every year, during which time matters of juſtice are diſpatched.

Term, in grammar, denotes ſome word or expreſſion in a language.

Term, in the arts, or term of art, is a word which, beſides the literal and popular meaning which it has, or may have in common language, bears a further and peculiar meaning in ſome art or ſcience.

Term, in logick. A proportion is ſaid to conſiſt of two terms, i. e. two principal and eſſential words, the ſubject and the attribute.

Terms *of an Equation*, in algebra, are the ſeveral names or members of which it is compoſed, and ſuch as have the ſame unknown letter, but in different powers or degrees: for, if the ſame unknown letter be found in ſeveral members in the ſame degree or power, they ſhall paſs but for one term.

As, in this equation, $xx + ax = bb$; the three terms are xx, ax, and bb.

Terms *of Proportion*, in mathematicks, are ſuch numbers, letters, or quantities, as are compared one with another.

Thus, if $\begin{matrix} 2 . 4 :: 8 : 16 \\ a, b :: c : d. \end{matrix}$ then a, b, c, d, or 2, 4, 8, 16, are called the terms; a being the firſt term, b the ſecond term, &c.

Terms, or courſes, in medicine, the menſes or women's monthly purgations.

TERMINALIA, in antiquity, feaſts celebrated by the Romans in honour of the god Terminus. Varro is of opinion this feaſt took its name from its being at the term or end of the year; but Feſtus is of a different ſentiment, and derives it from the name of the deity in whoſe honour it is held.

TERMINATION, *Terminatio*, in grammar, the ending of a word, or laſt ſyllable thereof. It is the different terminations of one and the ſame word on different occaſions, that conſtitute the different caſes, numbers, tenſes and moods, &c.

TERRA *firma*, in geography, is ſometimes uſed for a continent, in contradiſtinction to iſlands. Thus Aſia, the Indies, and South America, are uſually diſtinguiſhed into terra firma's and iſlands.

Terra *a Terra*. Gallies, and other veſſels, are ſaid to go terra a terra, when they never go far from the coaſts.

The phraſe is alſo applied, in the menage, to horſes which neither make curvets nor balotades, but run ſmoothly on the ground, on a preſſed gallop, only making little leaps or riſings with the fore feet.

Terræ-*Filius*, ſon of the earth, a ſtudent in the univerſity of Oxford, formerly appointed in publick acts, to make jeſting and ſatyrical ſpeeches againſt the members thereof, to tax them with any growing corruptions, &c.

TERRACE, or Terras, a walk or bank of earth raiſed in a garden or court to a due elevation for a proſpect.

Terrace, is alſo applied to the roofs of houſes that are flat, and whereon one may walk; as alſo to balconies that project.

TERRAQUEOUS, an epithet given to our globe of earth, conſidered as conſiſting of land and water, which, together, conſtitute one maſs.

TERRE-*Plain*, in fortification, the top platform, or horizontal ſurface of the rampart, whereon the cannon are placed, and the defenders perform their office.

TERRELLA, little earth, is a magnet turned of a juſt ſpherical figure, and placed ſo that its poles, equator, &c. do exactly correſpond to thoſe of the world. It was thus firſt called by Gilbert, as being a juſt repreſentation of the great magnetick globe we inhabit. Such a terrella, if nicely poiſed, and placed in a meridian like a globe, it was ſuppoſed, would be turned round like the earth in 24 hours, by the magnetick particles pervading it; but experience has ſhewn this to be a miſtake.

TERRESTRIAL Globe. See Globe.

TERRITORY, diſtrict, the extent or compaſs of land within the bounds, or belonging to the juriſdiction of any ſtate, city, or other diviſion.

TERSION, *Terſio*, the act of wiping or rubbing thing.

TERTIAN, *Tertiana*, a fever or ague intermitting every other day; ſo that there are two fits in three days.

The method for curing tertians, as well as other agues, is by the cortex, either given in ſubſtance or decoction: this laſt is beſt in weak conſtitutions, and where the fits are not ſo regular; but the ſubſtance is more to be depended on, as to certainty, in other caſes.

TERTIATE, in gunnery. To tertiate a great gun, is to examine the thickneſs of the metal at the muzzle, whereby to judge of the ſtrength of the piece, and whether it be ſufficiently fortified or not. This is uſually done with a pair of calliper compaſſes, and if the piece be home bored, the diameter leſs by the height, divided by two, is the thickneſs at any place.

TESSELATED Pavement, *Pavimentum teſſelatum*, a rich pavement of moſaick work, made of curious ſmall ſquare marbles, bricks or tiles, called teſſelæ, from the form of dies.

TEST, or Test *Oath*, a form of oath, whereby the doctrine of tranſubſtantiation, the ſacrifice of the maſs, the invocation of ſaints, &c. are abjured.

The teſt oath was firſt introduced by authority of parliament in 1672, and they who refuſed to take it, were excluded the privilege of holding any publick offices.

Test, among chymiſts and refiners, the ſame with cuppel or coppel, an inſtrument uſed in the purifying gold and ſilver.

TESTACEOUS, in natural hiſtory, an epithet given to a ſpecies of fiſh which are covered with a ſtrong thick ſhell; as tortoiſes, oiſters, pearl-fiſh, &c. In ſtrictneſs, however, teſtaceous is only applied to fiſh whoſe ſtrong and thick ſhells are entire and of a piece: thoſe which are ſoft, thin, and conſiſt of ſeveral pieces jointed, as the lobſter, &c. being called cruſtaceous.

But, in medicine, all preparations of ſhells, and ſubſtances of the like kind are called teſtaceous powders. Such are powder of crabs-claws and eyes, hartſhorn, pearl, &c. Dr. Quincy, and others, ſuppoſe the virtue of all teſtaceous medicines to be alike, that they ſeldom or never enter into the lacteals, but that the chief of their action is in the firſt paſſages; in which caſe they are of great uſe in abſorbing acidities.

Hence they become of uſe in fevers, and, eſpecially, in rectifying the many diſtempers in children, which generally owe their origin to ſuch acidities.

TESTAMENT, *Teſtamentum*, in law, a ſolemn and authentick act, whereby a perſon declares his will, as to the diſpoſal of his eſtate, effects, burial, &c.

Testament, in a religious ſenſe, is the covenant which God was graciouſly pleaſed to make known after the fall of Adam, which contains the method in which ſinners may be ſaved, viz. by the blood of Chriſt only. This covenant or teſtament is called Old and New, not becauſe of any difference in ſubſtance, but in regard of the manner of their diſpenſation; for they both teach, that it is impoſſible to obtain juſtification by works, both being

being delivered with blood; and that salvation is to be had only in the blood of Christ *.

TESTATOR, or TESTATRIX, the person who makes his or her will and testament.

TESTATUM, in law, a writ in personal actions, where, if the defendant cannot be arrested on a capias in the country where the action is laid, but is returned *non est inventus* by the sheriff, this writ shall be sent into any other county where such person is thought to be, or have wherewithal to satisfy the demand.

It is called testatum, because the sheriff has, before, testified that the defendant was not to be found in his bailiwick.

TESTES, in anatomy, two white, soft, oval bodies, serving for generation; usually called, diminutively, testicles.

TESTES *of the Brain*, are two little, round, hard bodies, between the third and fourth ventricle near the pineal gland.

TESTICLE, *Testis*, in anatomy, a double part in male animals, serving for generation. The testicles are two in number, of an oval or egg-like figure, and are contained in a peculiar bag, called the scrotum. See SCROTUM.

The use of the testicles is to produce the semen masculinum, for the purpose of generation. Some also give the name female testicles, testes muliebres, to the ovaries of women. See OVARIES.

TESTIMONIAL, a kind of certificate, signed either by the master and fellow of a college where a person last resided, or by three, at least, reverend divines, who knew him well for three years last past, giving an account of the virtuous uniformity and the learning of the person.

TESTIMONIAL is also a certificate under the hand of a justice of peace, testifying the place and time when a soldier or mariner landed, and the place of his dwelling, &c. whither he is to pass.

TESTUDO, the tortoise, in zoology, a genus of amphibious animals, with four legs and a tail, and the body covered with a firm shell. This genus comprehends all those animals known in English by the names of tortoises and turtles; of which there are a great many species, some with four toes on each foot; others with five toes on the fore feet, and four on the hinder ones; and others distinguished by other peculiarities, particularly the compartments of their shells, some being divided into irregular spaces, and others beautifully tessellated.

TESTUDO, *Tortoise*, in the military art of the ancients, was a kind of cover or screen which the soldiers, e. gr. a whole company, made themselves of their bucklers, by holding them up over their heads, and standing close to each other. This expedient served to shelter them from darts, stones, &c. thrown upon them, especially those thrown from above, when they went to the assault.

TESTUDO, was also a kind of large wooden tower which moved on several wheels, and was covered with bullocks hides flead, serving to shelter the soldiers when they approached the walls to mine them, or to batter them with rams. It was called testudo, from the strength of its roof, which covered the workmen as the shell does the tortoise.

TESTUDO *veliformis quadrabilis*, an hemispherical vault, or ceiling of a church, wherein four windows are so contrived, as that the rest of the vault is quadrable, or may be squared. The determining those windows was a problem proposed to the great mathematicians in Europe, particularly the cultivators of the new calculus differentialis, in the Acta Eruditorum Lipsiæ, by Sig. Viviani, under the fictitious name of A. D. pio lisci pusillo geometra, which was the anagram of postremo Galilæi discipulo.

It was solved by several persons, particularly Mr. Leibnitz, the very day he saw it: and he gave it in the Leipsick acts in a great variety of manners; as also did M. Bernouilli, the marquis de l'Hospital, Dr. Wallis, and Dr. Gregory.

TETANUS, in medicine, is a convulsive motion that makes any part rigid and inflexible.

TETRACHORD, in the ancient musick, a concord consisting of four degrees or intervals, and four terms or sounds; called also by the ancients diatesseron, and by us a fourth. This interval had the name tetrachord given it, with respect to the lyre and its chords or strings.

TETRADECARHOMBIS, in natural history, the name of a genus of fossils, of the class of the selenitæ, expressing a rhomboidal body, consisting of fourteen planes.

The characters of this genus are, that the bodies of it are exactly of the same form with the common selenitæ; but that in these each of the end-planes is divided into two, and there are, by this means, eight of these planes instead of four. Of this genus there are only three known species.

TETRADIAPASON, a musical chord, otherwise called a quadruple diapason, or eighth.

TETRADITÆ, a name given to several different sects of hereticks; such as the sabbathians, the manichees, and the followers of Petrus Fullensis, and others.

TETRADYNAMIA, in botany, the name of the fifteenth class of plants in Linnæus's system: this class consists of such plants as bear hermaphrodite flowers, and furnished with six stamina, two of which are shorter than the rest, by which circumstance they are distinguished from those of the hexadria class.

This class of plants is truly natural, and has been received as such, under whatever name, by all the systematick writers on botany, and includes the cruciformes of Tournefort, and siloquosæ and siliculosæ plants of Ray.

The plants in general belonging to this class are held to be antiscorbutick and diuretick; the taste in most is watery, mixed with a sharpness, but they commonly loose their virtues when dried.

To this genus of plants belong the scurvy-grass, mithridate-mustard, cabbage, turnep, radish, stock-gilliflower; with several other genera.

TETRAEDRON, or TETRAHEDRON, in geometry, one of the five regular or Platonick bodies or solids, comprehended under four equilateral and equal triangles.

It is demonstrated by mathematicians, that the square of the side of a tetraedon is to the square of the diameter of a sphere, wherein it may be inscribed, in a subsequialteral ratio: whence it follows, that the side of a tetraedron is to the diameter of a sphere it is inscribed in, as $\sqrt{2}$ to the $\sqrt{3}$; consequently they are incommensurable.

TETRAGON, in geometry, a general name for any four-sided figure, as a square, parallelogram, rhombus, or trapezium.

TETRAGONIA, in botany, a genus of plants, which with all its species are natives of the cape of Good-Hope.

TETRAGRAMMATION, a denomination given by the Greeks to the Hebrew name of God, Jehovah, because consisting of four letters.

TETRAGYNIA, in botany, the name of an order or subdivision in the Linnæan system, and is applied to those plants whose flowers have in each four pistils or female parts of generation. See BOTANY.

TETRAMETER, in ancient poetry, an Iambick verse, consisting of four measures, or eight feet. This kind of verse is only found in the comick poets, as Terence, &c.

TETRANDRIA, in botany, the name of the fourth class in the Linnæan system; it comprehends all those plants whose flowers are hermaphrodite and furnished with four equal stamina, or male parts, in each. To this class belong the teasel, scabious, madder, plantain, holly, with several other genera.

TETRAPETALOUS FLOWERS, among botanists, are those whose corolla consists of four petals; such compose the class tetradynamia. See TETRADYNAMIA.

TETRAPHARMACUM, signifies any remedy consisting of four ingredients.

TETRAPLA, in church history, a bible disposed by Origin, under four columns, in each whereof was a different Greek version, viz. that of Aquila, that of Symmachus, that of the Seventy, and that of Theodotion. See BIBLE.

TETRAPTERA, in the history of insects a name given to that order of insects, which have four wings.

TETRAPTOTE, *Tetraptoton*, in grammar, a name

* The Bible, or Holy Scriptures of the Old and New Testament, with archbishop Parker's preface, and *Beza*'s notes of the New Testament, which he made a present of to bishop *Grindal*, A. D. 1566; and of which that celebrated divine, the late Mr. *Toplady* thus wrote; "How much soever the bishop commended *Beza*'s Annotations, hardly any strain of commendation do exceed the merits "and value of those admirable notes;"—*Historick Proof*, vol. 2. p. 527. This Bible is now publishing in weekly numbers, Price six-pence, and to be compleated in sixty numbers, folio, by *Alexander Hogg*, No. 16, *Pater-noster-row*.

given to such defective nouns as have only four cases: such as *vicis*, *pecudis*, *sordis*, &c. as being deprived of the nominative and vocative singular.

TETRAPYRAMIDIA, in natural history, the name of a genus of spars, influenced in their shape by an admixture of particles of tin, and found in form of broad-bottomed pyramids of four sides. See SPAR.

TETRARCH, *Tetrarcha*, a prince who holds and governs a fourth part of a kingdom. Such originally was the import of the title tetrarch: but it was afterwards applied to any petty king or sovereign, and became synonymous with ethnarch.

TETRASTITCH, a stanza, epigram, or poem, consisting of four verses.

TETRASTYLE, in the ancient architecture, a building, and particularly a temple with four columns in its front.

TETRASYLLABICAL, a word consisting of four syllables.

TETRATONON, in musick, a name whereby the superfluous fifth is sometimes called, as containing four tones.

TEUCRIUM, germander, in botany, a genus of plants, whose flower is monopetalous and ringent, the tube of which is cylindrick and short, the upper-lip is erect and deeply divided into two acute segments, and the lower-lip is spreading and trifid, the lateral segments are like those of the upper one, but the middle one is large and roundish; there is no pericarpium, but the seeds, which are roundish, and four in number, are lodged in the bottom of the cup.

To this genus Linnæus has added the polium chamædrys and chamæpitys of Tournefort, with the scordium and marum syriadum of other authors.

The lesser creeping germander is accounted splenetick, hepatick, and diuretick, and good in intentions where deterging is wanted; it is also accounted an alexipharmick, and has been reckoned as a specifick against the gout.

TEUTONICK, something belonging to the teutons, an ancient people of Germany, inhabiting chiefly along the coasts of the German ocean; thus the teutonick language is the ancient language of Germany, which is ranked among the mother tongues. The teutonick is now called the German or Dutch, and is distinguished into upper and lower. The upper has two noteable dialects, viz. 1. The Scandian, Danish, or perhaps Gothick; to which belong the languages spoken in Denmark, Norway, Sweden, and Iceland. 2. The Saxon, to which belong the several languages of the English, Scots, Frisian, and those on the north of the Elbe. To the lower belong the Low Dutch, Flemish, &c. spoken through the Netherlands, &c.

TEUTONICK ORDER, a military order of knights, established towards the close of the 12th century, and thus called, as chiefly consisting of Germans or teutons.

TEXT, a relative term, contradistinguished to gloss or commentary, and signifying an original discourse exclusive of any note or interpretation. This word is particularly used for a certain passage of scripture, chosen by a preacher to be the subject of his sermon.

TEXTUARIES, *Textuarii*, a name given to the sect of the caraites among the Jews. See CARAITES.

TEXTURE, *Textura*, properly denotes the arrangement and cohesion of several slender bodies or threads interwoven or entangled among each other, as in the webs of spiders, or in cloth stuffs, &c.

Texture is also used in speaking of any union or constituent particles of a concrete body, whether by weaving, hooking, knitting, tying, chaining, indenting, intruding, compressing, attracting, or any other way. In which sense we say a close compact texture, a lax porous texture, a regular or irregular texture, &c. A great deal depends on the texture of the component parts of a body; hence most of its particular properties, its specifick gravity, colour, &c.

THALAMI *Nervorum Opticorum*, in anatomy, two oblong prominences of the lateral ventricles of the brain, medullary without, but a little cineritious within, being thus called because the optick nerves rise out of them.

THANE, or THAIN, *Thanus*, a name of an ancient dignity among the English and Scots, or Anglo-Saxons.

THANE-LANDS, were lands granted by charters of our ancient kings, to their thanes, with all immunities, except the three-fold necessity of expedition, repair of castles, and mending bridges.

THAWING, the resolution of ice into its former fluid state, by the warmth of the air, &c.

Boerhaave observes, that if a sudden thaw takes place after a long sharp frost, which has bound up the rivers, and penetrated the earth's surface to a considerable depth, it is, usually, quickly succeeded by a multitude of clouds and uncommon heats, and then by thunder and lightening. The reason is, that the fat vapours and exhalations raised by the subterraneous heat, have long remained imprisoned under that covering of the earth, as appears hence, that if the ice of a ditch be broke in the middle of a severe frost, it presently emits warm vapours, and this the more plentifully, as well as the hotter, by how much the frost is harder, and the ice is thicker. As soon, therefore, as the exterior frozen turf of earth is softened by warmth, the pent-up vapours immediately escape through all the passages they can find, and mounting on high, form clouds, which being driven about, and sometimes illumined by the sun, produce such effects. Hence these violent thunders in Muscovy, Sweden, and Denmark, after a thaw.

THEA, the tea-tree in botany. See TEA.

THEATINES, a religious order in the Romish church, so called from their principal founder John Peter Caraffa, then bishop of Theate, or Chiete, in the kingdom of Naples, and afterwards pope, under the name of Paul IV. The names of the other founders were Gaetan, Boniface, and Consiglieri. These four pious men desiring to reform the ecclesiastical state, laid the foundation of an order of regular clerks at Rome, in the year 1524. Pope Clement VII. approved the institute, and permitted the brethren to make the three religious vows to elect a superior every three years, and to draw up statutes for the regulation of the order. They first endeavoured, by their example, to revive, among the clergy, the poverty of the apostles and first disciples of our Saviour, and were the first who assumed the titles of regular clerks.

THEATRE, in antiquity, a publick edifice for the exhibiting of scenick spectacles, or shews, to the people; comprehending not only the eminence on which the actors appeared, and the action passed, but also the whole area of the place, common to the actors and spectators. See DRAMA, &c.

THEATRE is also used, in architecture, chiefly among the Italians, for an assemblage of several buildings, which, by a happy disposition and elevation, represents an agreeable scene to the eye.

Anatomical THEATRE, in a school of medicine and surgery, is a hall, with several rows of seats, disposed in the circumference of an amphitheatre; having a table bearing on a pivot, in the middle, for the dissection of bodies.

THEBAID, *Thebais*, a celebrated heroick poem of Statius, the subject whereof is the civil war of Thebes; between the two brothers Eteocles and Polynices; or Thebes taken by Thesius.

THEFT, *Furtum*, in law, an unlawful felonious taking away another man's moveable and personal goods, against the owner's will, with intent to steal them.

It is divided into theft or larceny, properly so called, and petit theft, or petit larceny; the former whereof is of goods above the value of 12d. and is deemed felony; the other, which is of goods under that value, is not felony. See FELONY and LARCENY.

THEME, in matters of education, denotes the subject of an exercise, for young students to write or compose on.

THENAR, in anatomy, the abductor-muscle of the thumb; it has its origin in the transverse ligament that joins the bones of the carpus, and its termination in the first and second phalanx; the two sesamoide bones of the thumb are usually found lodged in the tendon of this muscle.

THENAR is also the abductor-muscle of the great-toe; it has its origin from the internal-side of the calcaneum, and the os naviculare; and its termination at the internal side of the great-toe, beside the internal sesamoide bone.

THEOBROMA, in botany, a genus of plants, that includes the cacao of Tournefort, and the guazuma of Plumier; the former of which has an oblong quinquangular fruit, lengthened at each extremity, containing the seeds of which the chocolate is made. See CACAO and CHOCOLATE.

THEODOLITE, a mathematical instrument much used in surveying, for the taking of angles, distances, &c. It

It is made variously, several persons having their several ways of contriving it. The common one consists of a brass circle about a foot diameter, cut in the form represented in (*plate* LXXVI. *fig.* 15.) having its limb divided into 360°, and each degree subdivided either diagonally, or otherwise, into minutes.

Underneath, at *c c*, are fixed two little pillars *b b* (*fig.* 16.) which support an axis, whereupon is fixed a telescope consisting of two glasses, in a square brass tube, for the viewing of remote objects.

On the centre of the circle moves the index C, which is a circular plate, having a compass in the middle whose meridian line answers to the fiducial line *a a*: at *b b*, are fixed two pillars to support an axis which bears a telescope like the former, whose line of collimation answers to the fiducial line *a a*. At each end of either telescope, is fixed a plain sight for the viewing nearer objects.

The ends of the index *a a* are cut circularly, to fit the division of the limb B; and when that limb is diagonally divided, the fiducial line at one end of the index shews the degrees and minutes upon the limb. The whole instrument is mounted with a ball and socket, upon a three-legged staff. Most theodolites have no telescopes, but only four plain sights, two of them fastened on the limb, and two on the ends of the index.

THEOGONY, that branch of the heathen theology, which taught the genealogy of their gods.

THEOLOGY, or DIVINITY, a science which instructs us in the knowledge of God or divine things; or which has God, and the things he has revealed, for its object. See the article GOD.

Hence theology may be distinguished into natural, which comprehends the knowledge we have of God from his works, by the light of reason alone; and super-natural, which contains what we are taught concerning God in revelation.

Theology is again distinguished into positive, moral, and scholastick. Positive theology is the knowledge of the holy scriptures, and of the signification thereof, conformably to the opinions of the fathers and councils, without the assistance of any argumentation. Some will have it that this ought to be called expositive, rather than positive. Moral theology is that which teaches us the divine laws relating to our manners and actions. Scholastick, or school theology, is that which proceeds by reasoning; or that derives the knowledge of several divine things from certain established principles of faith.

THEORBA, THIORBA, or TIORBA, a musical instrument made in form of a large lute, except that it has two necks or juga, the second and longer whereof sustains the four last rows of chords which are to give the deepest sounds.

THEOREM, a speculative proposition, demonstrating the properties of any subject. Theorems are either universal, which extend to any quantity, without restriction universally; as this, that the rectangle of the sum, and difference of any two quantities, is equal to the difference of their squares: or particular, which extend only to a particular quantity; as this, in an equilateral right-lined triangle, each of the angles is 60°.

THEORETICK, or THEORETICAL, something relating to theory, or that terminates in speculation.

THEORY, in general, denotes any doctrine which terminates in speculation alone, without considering the practical uses and application thereof.

THERAPEUTÆ, a term applied to those who are wholly employed in the service of religion. This general term has been applied to particular sects of men, concerning whom there have been great disputes among the learned.

THERAPEUTICE, THERAPEUTICKS, that part of medicine which acquaints us with the rules that are to be observed, and the medicines to be employed in the cure of diseases.

THERAPHIM, or TERAPHIM, certain images, or superstitious figures mentioned in scripture.

Some Jewish writers tell us, the theraphim were effigies of human heads, placed in niches, and consulted as oracles. Others say, they were talismans, or figures of metal, cast and engraved under certain aspects of the planets; to which they ascribed extraordinary effects. All the eastern people are much addicted to this superstition; and the Persians still call them telesin, a name nearly approaching to theraphim.

The learned Spencer makes the word theraphim to be the same as seraphim, by change of the S into T: whence it follows, that these images were representations of these angels called seraphim. M. Jurien supposes them to have been a sort of dii penates, or houshold gods.

THERMOMETER, an instrument for measuring the increase and decrease of the heat and cold of the air, by means of the elastick and expansive power of bodies of the fluid sort.

Many different ways, methods, and forms of constructing such an useful instrument, have been thought of, and invented at several times for this purpose; at first air, then oil, then spirits of wine, and lastly, quicksilver, have been every way attempted and tortured in this experiment.

The spring of air, being sooner affected by heat and cold than that of any other fluid, was first thought upon as the best expedient to answer this end; and so it really would be, were it not that the weight of pressure of the atmosphere affects it also at the same time; and by acting sometimes with, sometimes against it, renders the effect by heat or cold very uncertain, and, therefore, the instrument useless. For example: the air in the bottle will, by its expansion, when the air grows warmer, raise the water in the tube; and if the air be lighter at this time, it will press less on the surface of the water, and so will suffer it to rise still higher. But if the air be heavier, it will act against the spring, and not permit it to raise the water so high. The same may be observed with respect to its contraction by cold; wherefore such an instrument, for common or constant use, will not do at all, though, perhaps, none is better calculated for some extemporaneous uses, as measuring the degree of coldness in different cellars, or of warmth in divers rooms upon the same floor.

It was upon this account found necessary to have recourse to some other fluid, which, secured from the pressure of the air in a tube, hermetically sealed, might expand and contract solely by the heat and coldness of the air about it. And because most fluids are subject to freeze or thicken in great degrees of cold, it was soon considered that spirits of wine, a little tinged with cochineal, would best answer the purpose, and accordingly thermometers were generally made therewith, and became of common use.

Though the spirit of wine thermometers would do very well to shew the comparative heat of the air, yet this was far short of the virtuoso's views, who wanted to explore the various and vastly different degrees of heat in other bodies, as boiling water, boiling oils, melted metals, and even fire itself, and degrees of cold too, beyond what the spirit thermometer can shew. For spirit in a moderate degree of heat will burst the tube; and in an intense degree of cold will freeze, as the French philosophers found, who went to measure a degree upon the surface of the earth under the north polar circle. It having been found by experiment, that linseed oil required four times the degree of heat to make it boil as water did, it was quickly substituted instead of spirits for philosophick uses. This Sir Isaac Newton always used, and by it discovered the comparative degree of heat which makes water boil, which melts wax, which makes spirit of wine boil, and melts tin and lead; beyond which we do not find the oil thermometer has been applied; for which reason, as also for its sullying the tube, it has been less used of late.

The mercurial thermometer, which will sustain any degree of heat or cold, as far as an instrument of this kind can be expected to do, was invented by Mr. Farenheit, of Amsterdam; and though several artificers made them as well as he, yet they still go by his name. Dr. Boerhaave used only this thermometer. As the mercury very freely and uniformly expands itself from hard frost to the heat of summer, so one sort of those thermometers are contrived with a scale, to include those extremes only, and the beginning of the divisions, or 0, is fixed to that altitude of the quicksilver, as is observed when water just begins to freeze, or snow to thaw; for which reason that is called the freezing point in the scale. This thermometer is small, short, put in a neat frame, and carried in the pocket any where.

But

But the grand thermometer of Farenheit is graduated after a different manner, as destined to a more critical and extensive use. In this the bulb, or large part at the bottom, is not spherical, as in common ones, but cylindrical; that the heat may penetrate and reach the inmost parts as soon as possible, so that the whole may expand uniformly together. Hence it is, that in the cylindrick bulb the fluid will expand and rise immediately, whereas in the spherical bulb it is seen first to fall, and then to rise, by the expansion of the fluid when heated.

Sir Isaac's seems to be the best fitted of any for a standard weather thermometer; and even for any degree of heat which the various states of the human body exhibit; and also for those different degrees which vegetation requires in the green-house, hot-bed, &c. In all which cases it is necessary there should be one common, unerring, and universal measure, or standard, which at all times, and at every place, will shew the same degree of heat, by the same expansion of the fluid, according to which the scale should be made in every standard thermometer. In order to this, the tube proposed should be very nicely weighed, when empty, and then the bulb, and about a tenth part of the length of the tube above it, is to be filled with quicksilver; then it is to be weighed again, and the excess of this, above the former weight, will give the weight of the quicksilver poured in; this will give the weight of the 100th part. Let a mark be made with a file upon the tube at the surface of the inclosed quicksilver.

Then weigh out nine or ten parcels of quicksilver, each equal to a 100th part of that first put into the tube, and having poured the several parcels in, one after another, upon the inclosed quicksilver, and marked the tube successively at the surface of each parcel, you will have the tube divided into proper intervals, which, if the bore of the tube be every where the same, will be equal to each other; if not, they will be unequal; and each of these intervals is to be divided into ten others, increasing or decreasing as the intervals do.

When this is done, the capacity of the tube is divided into 1000th parts of that of the ball, and the contiguous part of the tube reaching up to the first mark. The tube is now to be put into a frame, and by the side of it is to be placed a scale, divided into 1000th parts, exactly corresponding to those on the tube; and writing 1000 over-against the first mark, you write 1010 over-against the second, 1020 against the third, and so on.

The standard thermometer-tube, and its scale, being thus constructed, is then to be filled with some proper fluid, as linseed-oil, where great degrees of heat are not proposed; and mercury is to be used when they are. When the fluid is poured in, it is to be adjusted in such a quantity, that it may stand just at the principal point, marked 1000, in water just freezing. And here great precaution is to be used; for many trials must determine this point, to which the fluid must always rise by slow degrees, and with an uniform motion.

When this point is well secured, all the trouble is over, the ball, being then immersed in boiling water, spirits, oils, melted metals, &c. in snow, freezing mixtures, &c. the expansions, by all the various degrees of heat and cold, will be shewn by the number against the heights to which the fluid rises in the tube, in each case, these are to be wrote on the side of the scale; and, since the same degree of heat will cause the same expansion of the same fluid at all times, it is evident, if thermometers were every where constructed in this manner, the observations made by them in any part of the world may be compared together, which cannot otherwise be done; whence, this part of philosophy would receive its final perfection.

By one of those standard thermometers, well made, many more might soon be constructed with any expanding fluid, without the trouble of graduating their tubes by equal quantities of quicksilver. For having filled the balls, and a convenient part of the tube, with the proposed fluid, place them all together in a vessel of cold water: and while it is warming as gently as possible, when the oil in the standard-thermometer shall arise successively at the sevaral divisions of its scale, at the same instant of time mark the new tubes at the several heights of their fluids, and form a scale for every tube that shall correspond to those marks. Then, while the liquors subside, by cooling gently, examine whether they nicely agree at the several marks.

To determine the freezing point in all, they are to stand together in the water till it just begins to freeze: or, having all the other points duly, that may be deduced very exactly by the rule of proportion.

A thermometer that shall vary very sensibly by every small variation of heat and cold, as those of the atmosphere, must have a large ball in proportion to the bore of the tube; and, that the heat or cold may sooner penetrate the innermost parts of the liquor, the ball should not be spherical, but oblong and flatted like a French flask; and the lengths of the tubes should be proportioned to the degree of heat they are intended to discover.

Sir Isaac Newton graduated his standard-thermometer on both sides. Those on the right-hand measured the heat of the oil; as those on the left, measured the bulk thereof: but since the latter, as well as the former, begins from a cypher at the freezing-point, and is regularly continued upwards by the common divisions 10, 20, 30, 40, &c. it will equally serve both purposes; since the degree of heat will always be proportioned to the expansion of the bulk of the fluid above or below the freezing point.

THERMOSCOPE, an instrument shewing the changes happening in the air with respect to heat and cold.

The word thermoscope is generally used indifferently with that of thermometer, though there is some difference in the literal import of the two; the first signifying an instrument that shews, or exhibits, the changes of heat, &c. to the eye; and the latter an instrument that measures those changes: on which foundation the thermometer should be a more accurate thermoscope, &c.

This difference the excellent Wolfius taking hold of, describes all the thermometers in use as thermoscopes; shewing that none of them properly measures the heat, &c. none of them do more than indicate the same. Though their different heights, yesterday and to-day, shew a difference of heat, yet, since they do not discover the ratio of yesterday's heat to to-day's, they are not strictly thermometers.

THESIS, a general position which a person advances, and offers to maintain. In colleges it is frequent to have placards, containing a number of them, in theology, in medicine, in philosophy, in law, &c.

THIGH, *Femur*, in anatomy, that part of the body of men, quadrupeds, and birds, between the leg and the trunk.

THIMBLE, an instrument made of brass, silver, iron, &c. put on the finger to thrust a needle through any cloth, silk, &c. used by all seamstresses, taylors, &c.

THINKING, a general name for any act or operation of the mind. See MIND.

Chauvinus, with the Cartesians, will have thinking to consist in a certain native inherent motion or agitation of the human mind, whereof itself is conscious; for they conceive it to be no other than the very essence of the mind itself, or at least its principal and essential property. All the materials of thinking are, by Mr. Locke, derived from the two sources of sensation and reflection. The school-philosophers usually divide thinking into intellectual and volitive. Intellectual is subdivided into perception, judgment, reasoning, and method. Volitive thinking, or volition, admits of infinite different modifications, or new determinations. The doctrine of the Cartesians, who maintain that thinking is essential to the human soul, and that there is no time when the human soul does not think, is overturned by Mr. Locke, who shews, that in sleep without dreaming, there is an entire cessation of all the modes of thinking.

THIRD, in musick, a concord resulting from a mixture of two sounds, containing an interval of two degrees.

THISTLE, *Carduus*, a name common to divers plants, whose flowers are composed of several little longish leaves, ranged close together in a sort of head, and whose leaves are usually squammose and prickly.

Order of the THISTLE, or *of St.* ANDREW, a military order of knighthood in Scotland, the rise and institution whereof is variously related by different authors: Lesley, bishop of Ross, reports, that the night before the battle between Athelstan king of Northumberland, and Hungus king of the Picts, a bright cross, in form of that whereon St. Andrew, the tutelar saint of Scotland, suffered martyrdom, appeared to Hungus, who, having gained the victory, ever after bore the figure of that cross on his banners. Others assert, that Achaius king of

Scotland first instituted this order, after having made the famous league offensive and defensive with Charlemagne king of France. But although the thistle had been acknowledged as the symbol of the kingdom of Scotland from the reign of Achaius, yet some refer the beginning of this order to the reign of Charles VII. of France. Others place the foundation of it as low as the year 1500.

The chief and principal ensign is a gold collar, composed of thistles and sprigs of rue, interlinked with amulets of gold, having pendant thereunto the image of St. Andrew with his cross, and this motto, NEMO ME IMPUNE LACESSET.

THLASPI, treacle mustard, in botany, a genus of plants, producing cruciform flowers; the petals are oval, double the length of the cup, having narrow ungues: the stamina are six filaments, two of which are shorter than the rest, and topped with acuminated antheræ: the fruit consists of a compressed heart-shaped pod, with an emarginated border, containing two cells, which include several seeds affixed to a suture. There are several species belonging to this genus, among which is included the bursa pastoris, or shepherd's pouch.

The wild thlaspi, which grows naturally in several parts of England, is said to promote urine, and to dissolve coagulated blood; and the seeds are an ingredient in the mithridate and Venice treacle.

THLIPSIS, a compression of the stomach from food, which is offensive only by its quantity, and not endued with any remarkable quality; or from a conflux of humours, void of acrimony, into the part.

THOMÆANS, THOMEANS, THOMISTS, or *Christians of St.* THOMAS, a people of the E. Indies, who, according to tradition, received the gospel from St. Thomas. Upon the arrival of the Portuguese at Calicut, in their first voyage to the Indies, they met with ancient Christians, who pretended to be descended from those converted by St. Thomas.

St. THOMAS's *Day*, a festival of the Christian church, observed on December 21, in commemoration of St. Thomas the Apostle.

THORACICK, *Thoracicus*, a name given to two branches of the axillary artery, on account of their conveying the blood into some parts of the thorax.

The thoracick arteries are distinguished into upper and lower. There are likewise thoracick veins, upper and under, destined for the conveyance of the blood from the thorax to the axillary vein.

THORACICK DUCT, or CHYLIFEROUS DUCT, a very slender canal, receiving the chyle from the chyliferous vessels, and the lymph from the lymphaticks, and carrying them to the thorax, and usually through it to the subclavian vein.

The beginning of this duct is in the reservoir or receptaculum chyli, which is situated in the left side of the upper vertebra of the loins, under the aorta, and vessels of the left kidney: the rest of the duct has some resemblance of a sack or bag, and is larger and more irregular in its figure. Its end is usually in the subclavian vein; sometimes in the jugular. In dogs, and many other animals, its progress is under the aorta; but in the human body it ascends along the right side of the vertebra of the back, and passes between the aorta and the vena azygos, sometimes with a simple trunk, sometimes divided into two: its breadth, where divided, is about that of a wheat straw.

The best manner of demonstrating it in animals, is to feed a dog well, and then to strangle him; and as soon as the body is opened, to tie it up with a thread in the breast, just by the subclavian; by this means, the cistern, or receptacle of the chyle, and the chyliferous vessels and lymphaticks, are all exposed evidently to view at once.

In a human body, they may also be observed any time after death, by injecting, according to Salzman, wax, or any fluid, or indeed only by inflating the great lymphatick vessel, which runs by the left emulgent vein; or, otherwise, if, according to Henninger, an injection, or barely an inflation, be made into a lacteal of the second order, to be traced out in the middle of the mesentery; or, finally, if the plura be carefully cut between the aorta and the vena azygos, the duct will usually be easily found there.

It is composed of a fine, thin, and pellucid membrane, and within it there are valves, as in the lacteals and lymphaticks, which prevent the reflux of the chyle. There are more of these in the human body than in beasts; and, finally, there is a semilunar valve, closing its extremity under the subclavian.

The use of the thoracick duct is to carry the chyle to the blood, through the thorax, as it receives it from the receptacle, and with it the lymph from the lymphaticks.

THORAX, in anatomy, that large part of the body situated between the abdomen and the neck.

The parts of the thorax are of two kinds, the continent, or containing, and contained: the continent parts, or those which form the cavity, are either common or proper; the common continent parts of the thorax are the cuticula, the cutis and pinguello.

The uses of the parts of the thorax in general, are their serving to respiration and the circulation of the blood, in both sexes; and, in women, to the producing milk.

THORN-APPLE, in botany. See DATURA.

THORNBACK, in ichthyology, the prickly raia, with tuberculose teeth, and a transverse cartilage in the belly.

THOUGHT, or sentiment, a general name for all the ideas consequent on the operations of the mind, and even for the operations themselves.

THRASHING, or THRESHING, *Flagellatio*, in agriculture, the art of beating the corn out of the ears.

THRAVE, or THREAVE *of Corn*, 24 sheaves, or four shocks of six sheaves to the shock; though, in some countries, they only reckon 12 shocks to the thrave.

THREE, *Rule of*. See RULE.

THRENODY, *Threnodia*, a mournful or funeral song.

THROAT, the anterior part of an animal, between the head and shoulders, wherein is the gullet.

THROAT, in architecture, fortification, &c. See the article GORGE.

THRONE, a royal seat, or chair of state, enriched with ornaments of architecture and sculpture, made of some precious matter, raised on one or more steps, and covered with a kind of canopy. Such are the thrones in the rooms of audience of kings, and other sovereigns.

THROWSTER, one who prepares raw silk for the weavers, by cleansing and twisting it.

THRUSH, in ornithology, two species of turdus, the one called the common thrush, and the other the missel-thrush.

THUMB, *Pollex*, in anatomy, one of the parts or extremities of the hand. See HAND.

THUMMIM, in the scripture-learning. See the article URIM and *Thummim*.

THUNDER, a noise in the regions of the air, excited by a sudden kindling of sulphureous exhalations.

The cause of thunder long puzzled the philosophers, and various hypotheses were formed for removing the difficulty; but the ingenious Dr. Franklin has solved the problem by shewing, that it is nothing more than the electrick fluid, darting from the clouds, in which it is collected.

The distance the thunder is from us, may nearly be estimated by the interval of time between our seeing the lightning, and hearing the thunder; for as the motion of light is so very quick, that the time it takes up in coming to us from the cloud, is not perceptible; and as that of a sound is about 1000 feet in a second; allowing 1000 feet for every second that passes between our seeing the one, and hearing the other, we have the distance of the cloud, pretty nearly, from whence the thunder comes.

THUNDERING LEGION, *Legio Fulminans*, was a legion in the Roman army, consisting of Christian soldiers, who in the expedition of the emperor Marcus Aurelius against the Sarmatæ, Quadi, and Marcomanni, saved the whole army then ready to perish of thirst, by procuring, with their prayers, a very plentiful shower thereon, and at the same time a furious hail, mixed with lightning and thunderbolts, on the enemy.

This is the account commonly given by ecclesiastical historians, and the whole history is engraven in bass-relievos on the Antonine column. And hence arose the denomination of thunderers, though some say, that the legion those Christians were of, was called the thundering legion before.

THURSDAY, the fifth day of the Christian week, but the sixth day of that of the Jews.

Holy-THURSDAY, the same with ascension-day. See the article ASCENSION.

Maundy-

Maundy-Thursday, *Dies Mandati*, the thurfday before Eafter; it being a cuftom on that day to give a largeffe to the poor.

THYMUS, the thyme plant, of which there are feveral forts; as the broad-leaved thyme, variegated thyme, narrow-leaved thyme, orange and lemon thyme, fo called, &c. They are all eafily propagated, by fowing their feeds or parting their roots, which may be done either in the fpring or autumn; a dry foil is beft for thefe plants, as their virtues are ftronger than if growing in moift wet lands, and likewife they are not fo apt to be deftroyed in fevere winters.

All fpecies of thyme are carminative, attenuant, and diuretick. The common thyme, though generally ufed in our tables, is not without its medicinal virtues, equal to thofe of any of the reft; but the more agreeable flavour of the lemon thyme has made it be generally received in its place. The common thyme is an excellent nervous medicine; it makes an agreeable kind of tea, in the common way of tea-making; and a courfe of this alone, has cured many habitual nervous complaints, which have foiled the more common medicines. That common and troublefome difeafe, the night-mare, is more certainly cured by a courfe of this infufion, than, perhaps, of any other medicine.

Thymus, in anatomy, a gland, which in infants is very remarkable: it is fituated in the upper part of the thorax, immediately under the fternum, and lies upon the pericardium, and on the trunk of the aorta, and of the vena cava. It extends itfelf from the pericardium, along the trunk of the aorta, to the beginning of the carotids, fometimes fo far as to the thyroide-gland; its figure is irregular and uncertain; its colour in infants is a pale red, in adults it is of a dufkier hue: it is much larger in infants newly born, than in fubjects at any more advanced period. Its length is there no lefs than three fingers breadth, and its diameter two, its thicknefs is about half a finger: it gradually decreafes from this fize, as the child grows up; in adults it is very fmall, and in old people it entirely difappears. Its fubftance is glandulous and conglomerate, and it is furrounded by a membrane. It has blood-veffels fometimes from the fubclavians, fometimes from the mammary, and fometimes from the mediaftine ones; and in fome fubjects from the carotids and jugulars. Its lymphaticks fometimes run to the thoracick duct, fometimes to the fubclavian veins; the they have in general no valves.

THYROIDE Gland, in anatomy, is of a very fingular figure, refembling that of the new moon. It adheres by its middle part, which is called by authors its ifthmus, to the upper ring of the trachea, and its points or horns are turned upwards. It adheres on each part to the larynx and œfophagus.

Thyroide Cartilage, one of the five cartilages that principally compofe the larynx.

THYROSTAPHYLINUS, in anatomy, the name of a mufcle of the uvula, which, arifing from the lateral part of the thyroide cartilage, and afcending towards the uva, becomes larger, and is inferted in manner of an arch, in the fide of the velum palatinum.

THYRSUS, in antiquity, the fceptre which the poets put into the hand of Bacchus, and wherewith they furnifhed the Menades in their Bacchanalia.

The thyrfus was originally a lance or fpear, wrapped up in vine-leaves, wherewith Bacchus is faid to have armed himfelf and his foldiers in the Indian wars, to amufe and deceive the unpractifed Indians, and make them expect no hoftilities.

TIBIA, in anatomy, is the inner and bigger bone of the leg, called alfo focile majus: it is hard and firm, with a cavity in its middle: it is almoft triangular; its fore and fharp edge is called the fhin.

TIBIALIS, or Tibiæus, in anatomy, the name of two mufcles of the foot, diftinguifhed by the epithets anticus and pofticus.

The tibialis anticus, one of the flexor mufcles, has its origin from the fuperior and extenfor furface of the tibia, and is terminated at the internal os cuneiforme, and the interior part of the internal metatarfal bone.

The tibialis pofticus, or abductor mufcle of the foot, has its origin in the upper part of the interoffeous ligament, and its termination in the os naviculare.

TIDES, two periodical motions of the waters of the fea, called the flux and reflux, or the flow and ebb.

The caufe of the tides is the attraction of the fun and moon, but chiefly of the latter; the waters of the immenfe ocean, forgetful, as it were, of their natural quietus, move and roll in tides, obfequious to the ftrong attractive power of the moon, and weaker influence of the fun.

To illuftrate this, let us fuppofe the force of the moon's attraction to decreafe, as the fquare of the diftance from its centre increafes (as in the earth, and other celeftial bodies) and we fhall find, that where the moon is perpendicularly either above or below the horizon, either in the zenith or nadir, there the force of gravity is moft of all diminifhed, and, confequently, that there the ocean muft neceffarily fwell, by the coming in of the water from thofe parts where the preffure is greateft, viz. in thofe places where the moon is near the horizon. But, that this may be fully underftood, let M (*plate* LXXVI. *fig.* 5.) reprefent the moon, E the earth, C its centre, Z the place where the moon is in the zenith, N where the nadir.

Now by this hypothefis it is evident, that the water in Z, being nearer, is more attracted by the moon, than the centre of the earth C, and that, again, more than the water in N; therefore, the water in Z has a tendency towards the moon, contrary to that of gravity, being equal to the excefs of the gravitation of Z, above that in C. And, in the other cafe, the water in N, tending lefs towards the moon than the centre C, will be lefs preffed, by as much as is the difference of the gravitations towards the moon in C and in N.

This being rightly underftood, it follows plainly, that the fea, which otherwife fhould be fpherical upon the preffure of the moon, muft form itfelf into a fpheroidal or oval figure, whofe longeft diameter is where the moon is vertical, and fhorteft where fhe is in the horizon; and that the moon fhifting her pofition, as fhe turns round the earth once a day, this oval of water fhifts with her, occafioning, thereby, the two floods and ebbs obfervable in each 25 hours.

And this may fuffice as to the general caufe of the tides; it remains now to fhew how naturally this motion accounts for all the particulars that have been obferved about them; fo that there can be no room left to doubt but that this is the true caufe thereof.

The fpring tides upon the new and full moons, and the neap tides on the others, are occafioned by the attractive force of the fun, in the new and full confpiring with the attraction of the moon, and producing a tide by their united forces; whereas in the quarters the fun raifes the water, when the moon depreffes it, and on the contrary; fo as the tides are made only by the difference of their attraction.

That the force of the fun is no greater in this cafe, proceeds from the very fmall proportion the femi-diameter of the earth bears to the vaft diftance of the fun.

It is alfo obferved that *cæteris paribus*, the equinoctial fpring tides in March and September, or near them, are the higheft, and the neap tides the loweft; which proceeds from the greater agitation of the waters, when the fluid fpheroid revolves about a great circle of the earth, than when it turns about in a leffer circle; it being plain, that if the moon were conftituted in the pole, and there ftood, the fpheroid would have a fixed pofition, and it would always be high water under the poles, and low water every where under the equinoctial: and, therefore, the nearer the moon approaches the poles, the lefs is the agitation of the ocean; which is, of all, the greateft, when the moon is in the equinoctial, or fartheft diftant from the poles.

Whence the fun and moon, being either conjoined or oppofite, in the equinoctial, produce the greateft fpring and neap tides, being produced by the tropical moon in the quarters, are always the leaft tides; whereas, in June and December, the fpring tides are made by the tropical fun and moon, and therefore, lefs vigorous, &c. the neap tides by the equinoctial moon, and therefore are the ftronger.

Hence it happens, that the difference between the fpring and neap tides is much lefs confiderable than in March and September.

And the reafon why the higheft fpring tides are found to be rather before the vernal, and after the autumnal equinox,

equinox, viz. in February and October, than precisely upon them, is, because the sun is nearer the earth, in the winter moons, and so comes to have a greater effect in producing the tides.

Hitherto we have considered such affections of the tides as are universal, without relating particular cases: what follows from the differing latitudes of places, will be easily understood.

Let A P C (*plate* LXXVI. *fig*. 4.) be the earth covered over with very deep waters, C its centre, P P its poles, A E the equinoctial, F *f* the parallel of latitude of a place, D*d* another parallel at equal distance on the other side of the equinoctial, H *h* the two points when the moon is vertical; and let K K be the great circle wherein the moon appears horizontal.

It is evident, that a spheroid described on H H and K K shall nearly represent the figure of the sea; and C *f*, C D, C F, C *d*, shall be the heights of the sea in the places *f* D, *f* D, in all which it is high water: and seeing that in 12 hours time, by the diurnal rotation of the earth, the point F is transferred to *f*, and *d* to D; the height of the sea C F will be that of high water, when the moon is present; and C *f* that of the other high water, when the moon is under the earth; which, in the case of this figure, is less than the former C F.

And in the opposite parallel D *d*, the contrary happens: the rising of the water being always alternately greater and less in each place, when it is produced by the moon's declining sensibly from the equinoctial, that being the greatest of the two high waters in each diurnal revolution of the moon, wherein she approaches either to the zenith or nadir of the place. Whence it is that the moon, in the northern signs, in this part of the world, makes the greatest tides above the earth, and in the southern signs when under the earth; the effect being always the greatest, when the moon is furthest from the horizon, either above or below it.

And this alternate increase and decrease of the tides has been observed to hold true on the coast of England, at Bristol by Capt. Sturmy, and at Plymouth by Mr. Colepress.

But the motions hitherto mentioned are somewhat altered by the libration of the water; whereby, though the action of the luminaries should cease, the flux and reflux of the sea would for some time continue: this conservation of the impressed motion distinguishes the difference that otherwise would be between two consequent tides, and is the reason why the highest spring tides are not precisely on the full and new moons, nor the neaps on the quarters; but, generally, they are the third tides after them, and sometimes later.

All these things would regularly come to pass, if the whole earth were covered with sea very deep; but by reason of the shoalness of some places, and the narrowness of the streights, by which the tides are, in many places, propagated, there arises a great diversity in the effect, not to be accounted for, without an exact knowledge of all the circumstances of the places; as of the position of the land, and the breadth and depth of the channels by which the tide flows: for a very slow and imperceptible motion of the whole body of the water, where it is (for example) two miles deep, will suffice to raise its surface 10 or 12 feet in a tide's time; whereas if the same quantity of water were to be conveyed upon a channel of 40 fathom deep, it would require a very great stream to effect it, in so large inlets as are the channel of England and the German ocean, whence the tide is found to set strongest in those places where the sea grows narrowest, the same quantity of water going through a smaller passage. This is most evident in the streights between Portland and Cape le Hague in Normandy, where the tide runs like a sluice; and would be yet more between Dover and Calais, if the tide coming about the island from the north did not check it. And this force being once impressed upon the water, continues to carry it about the level of the ordinary height in the ocean, particularly where the water meets a direct obstacle, as it is in St. Maloes; and where it enters into a long channel, which, running far into the land, grows very streight at its extremity, as it is in the Severn sea at Cheapstow and Bristol.

The shoalness of the sea, and the intercurrent continents, are the reason that in the open ocean the time of high water is not at the moon's appulse to the meridian, but always some hours after it, as it is observed upon all the west coast of Europe and Africa, from Ireland to the Cape of Good Hope: in all which a south-west moon makes high water, and the same is reported to be on the west of America.

TIDE-*Waiters*, or *Tide-Men*, certain officers belonging to the custom-house, appointed to watch or attend on ships coming from abroad, to see that nothing be landed till the custom be paid.

TIERCE, or TEIRCE, a measure of liquid things, as wine, oil, &c. containing 42 gallons, the third part of a pipe.

TIERCED, *Tierce*, in heraldry, denotes the shield to be divided by any of the partition lines, party, coupy, tranchy, or tailly, into three equal parts of different colours or metals.

TIGE, in architecture, a French term for the shaft or fust of a column, comprehended between the astragal and the capital.

TIGER, or TYGER, *Tigris*, in zoology, an animal belonging to the felis kind, with an elongated tail, and variegated spots.

TILIA, the lime, or linden-tree. The common lime-tree has a deep spreading root, that sends forth a very large trunk, which produces so many branches as to render it very proper for shady walks; it is covered with a smooth bark, which is yellowish or whitish within, and is so tough and flexible, that, in some places, where better materials are scarce, they make cords or cables therewith: the leaves are broad, roundish, and terminate in a point; their edges are dentated, and their upper surface is generally covered with a honey dew, and the flowers grow in bunches.

This tree is of a very long duration, and often of a large magnitude; it naturally grows in a pyramidical form, and has a beautiful appearance; though, of late years, it has not been held so much in esteem as formerly, because it is late in the spring before the leaves come out, and is the first which sheds them, particularly when planted in a dry soil; the leaves frequently decay in July, and are continually falling off, making a litter all the remaining part of the summer.

The timber of the lime is used by carvers, it being a soft light wood; also by architects, for framing the models of their buildings: it is likewise used by turners for making light bowls, dishes, &c. and of late is much made use of in cabinet work.

TILLER, or TILLAR, in husbandry, a little young tree left to grow till it be fellable.

TILLER *of a Ship*, is a strong piece of wood fastened in the head of the rudder, and in small ships and boats is called the helm. In men of war, and other large ships, the tiller is fastened to the rudder in the gun-room, and to the other end there are ropes fastened, which pass upwards to the quarter-deck, where the ship is steered by a wheel.

TILLING, tillage, in gardening and agriculture, a moving or stirring of the ground with the plough or spade; which, being performed on the surface, enters to a certain depth, and makes the lower and upper parts change places; by which means the goodness of the earth is kept from being spent in feeding ill plants.

The rule, as to gardening in general, is, that hot and dry earth should be tilled in summer, either a little before, or while it rains, or soon after; and that neither too often nor too deep: in hot weather it is not to be performed, unless watered soon after; but for moist, strong, and cold earth, it must never be tilled in time of rain, but, rather, in the greatest heats. As to arable lands, that which is clayey, stiff, cold, and moist, is generally thrice tilled in spring, summer, and at seed-time, for wheat, and four times for barley.

These repeated ploughings, or fallowings, are very advantageous to the soil, both as they destroy weeds, and as the ground is hereby laid in ridges, which prevents its being over-drenched in wet seasons, saves it much from blights and bad weather, and makes the land lighter and fitter for the seed to take root in, and to imbibe the nitrous dews and influences of the air, &c.

TIMAR, a tract or portion of land which the Grand Signior grants to a person on condition of serving him in war on horseback.

TIMARIOTS, thofe who enjoy lands on the footing and tenure of timars.

TIMBER, includes all kinds of felled and feafoned woods ufed in the feveral parts of building, as carpentry, joinery, turnery, &c.

The kinds of timber are numerous; we fhall only mention fome of the moft ufual from Evelyn's Sylva, &c. as,

1. Oak, the ufes whereof need no enumerating: to endure all feafons and weathers, there is no wood like it; hence its ufe in building fhips, in pofts, rails, &c. For water-works it is fecond to none, and where it lies expofed both to air and water, there is none equal to it.

2. Elm. This felled between November and February is all fpine or heart, and no fap, and is of fingular ufe in places where it is always wet or dry; its being tough makes it ufeful to wheel-wrights, mill-wrights, &c. and its not being liable to break and fly in chips, makes it fit for dreffers and planks to chop on.

3. Beech. Its chief ufe is in turnery, joinery, and upholftery, and the like; as being of a white, fine grain, and not apt to bend or flit. Of late it is ufed for building timber; and if it lie conftantly wet, is judged to outlaft oak.

4. Afh. Its ufe is almoft univerfal; it is good for building where it may lie dry. It ferves the carpenter, cooper, turner, plough-wright, wheel-wright, gardener, and at fea for oars, hand-fpikes, and many other ufes.

5. Fir, commonly known by the name of deal, is of late much ufed in building, efpecially within doors, for ftairs, floors, wainfcot, and moft works of ornament.

6. Walnut-tree is of univerfal ufe, unlefs for the outfides of buildings; very fit for the joiners ufe, being of a more curious brown colour than beech, and lefs fubject to worms.

7. Chefnut-tree, next to oak, is the timber moft fought for by joiners and carpenters; it is very lafting.

8. Service-tree, ufed in joinery, as being of a delicate grain, and fit for curiofities: it alfo yields beams of confiderable bignefs for building.

9. Poplar, abel: this and afpen, differing very little in their nature, are of late much ufed inftead of fir; they look as well, and are more tough and hard.

10. Alder, much ufed for fewers, or pipes, to convey water; when always wet, it grows hard like a ftone, but foon rots, if it is alternately wet and dry.

TIMBRE, or TIMMER, in heraldry, denotes the creft of an armoury, or whatever is placed a-top of the efcutcheon, to diftinguifh the degree of nobility, either ecclefiaftical or fecular.

TIME, a fucceffion of phænomena in the univerfe; or a mode of duration, marked by certain periods or meafures, chiefly by the motion and revolution of the fun.

The idea of time, in the general, Mr. Locke obferves, we acquire by confidering any part of infinite duration as fet out by periodical meafures: the idea of any particular time or length of duration, as a day, an hour, &c. we acquire, firft, by obferving certain appearances at regular, and, feemingly, at equidiftant periods.

Now by being able to repeat thofe lengths or meafures of time, as often as we will, we can imagine duration, where nothing really endures or exifts; and thus we imagine to-morrow, next year, &c.

Some of the latter fchool philofophers define time to be the duration of a thing, whofe exiftence is neither without beginning nor end: by which, time is diftinguifhed from eternity.

Abfolute TIME, is time confidered in itfelf, and without any relation to bodies, or their motions. This flows equally, i. e. never proceeds fafter or flower, but glides on in a conftant, equable tenor.

Relative, or *apparent* TIME, is the fenfible meafure of any duration by means of motion. For fince that equable flux of time does not affect our fenfes, nor is any way immediately cognizable thereby, there is a neceffity for calling in the help of fome nearly equable motion to a fenfible meafure, whereby we may determine its quantity, by the correfpondency of the parts of this with thofe of that.

Hence, as we judge thofe times to be equal which pafs, while a moving body, proceeding with an equable velocity, paffes over equal fpaces; fo we judge thofe times to be equal, which flow while the fun, moon, and other luminaries, perform their revolutions, which, to our fenfes, are equal.

But fince the flux of time cannot be accelerated, nor retarded, whereas all bodies move fometimes fafter and fometimes flower, and there is, perhaps, no perfectly equable motion in all nature; it appears hence to follow, that abfolute time fhould be fomething truly and really diftinct from motion. For let us fuppofe the heavens and ftars to have remained without motion from the very creation: does it hence follow, that the courfe of time would have been at a ftand? Or, rather, would not the duration of that quiefcent ftate have been equal to the very time now elapfed?

Aftronomical TIME, is that taken purely from the motion of the heavenly bodies, without any other regard.

Civil TIME, is the former time accommodated to civil ufes, and formed and diftinguifhed into years, months, days, &c.

TIME, in mufick, is affection of found, whereby we denominate it long or fhort, with regard to its continuance in the fame degree of time.

Common, or *duple* TIME, is of two fpecies. The firft, when every bar or meafure is equal to a femi-breve, or its value, in any combination of notes of a lefs quantity.

The fecond, where every bar is equal to a minim, or its value, in lefs notes. The movements of this kind of meafure are various, but there are three common diftinctions; the firft flow, the fecond brifk, the third very quick.

TIME, in fencing. There are three kinds of time; that of the fword, that of the foot, and that of the whole body. All the times that are perceived out of their meafure, are only to be confidered as appeals, or feints, to deceive and amufe the enemy.

TIN, *Stannum*, a whitifh metal, fofter than filver, yet much harder than lead.

Tin is the lighteft of all the metals: it is remarkable for a quality that no other of them has, which is, that when bent, it makes a crackling noife. It is fometimes harder than lead, but lefs fo than any other of the metals: it is malleable in a very remarkable degree, though lefs fo than lead: it may be eafily drawn into a coarfe wire, but if this be attempted to be brought to any degree of finenefs, it fnaps and breaks under the workman's hands.

Tin is lefs fufceptible of ruft than moft of the other metals: it is very little elaftick, and fcarce at all fonorous.

It melts with a much fmaller degree of fire than any other metal, a heat but a little greater than boiling water being fufficient to fufe it. It melts, before it grows red-hot, like lead; and fo much lefs a degree of heat, even than that requifite to the running of lead, is neceffary to the fufing of this metal, that it may be eafily feparated from the other by eliquation; and if the fire be kept under a mixed mafs of the two, fo low as to be juft hot enough to melt the lead, the tin will all run off from it.

Tin amalgamates very readily with mercury, and may be mixed, in fufion, with moft other metals, and as readily feparated from any of them again by the before-mentioned procefs of eliquation. It is the leaft fimple of all the metals, being brought, by a very fmall degree of fire, to emit fulphureous fumes; thefe are plainly the abfolute fulphur of the metal: they do great injury to the people employed to work upon it, rendering them pale, and often abfolutely deftroy them. The confequence of the emitting thefe fumes fo abundantly is, that tin, of all metals, lofes moft of its weight, and calcines moft eafily in the fire. Expofed to the focus of a great burning-glafs, it immediately melts, and fends off a large quantity of thick, white fume; the remaining matter is then a fine cryftalline, or gloffy matter, in form of needles; thefe, if held ever fo long in the fame heat, undergo no further change, never running into a mafs of glafs, as the remains of moft of the metals do under the fame circumftances; but like the glaffes of the other metals, if expofed again to the fame heat, laid on a piece of charcoal, they immediately run into tin again; and the fame thing happens if it be continued on the tile or copel it was firft placed on in the focus, and fome fat matter, as tallow, or the like, to be added to it. Filings of tin, thrown into the flame of a candle, take fire, and render the flame blue, emitting a vifible fume, and a fmell of garlick: melted in a crucible, with a mix-

a mixture of nitre, it deflagrates. Its conftituent matters, therefore, feem to be a cryftalline earth, which melts with great difficulty, and an inflammable fulphur; in which, from its fmell, while calcining, and from its poifonous quality, it is probable there may be fomething of arfenick mixed.

The fpecifick gravity of pure tin is laid down by authors from 7156, to 7617, to 1000, to that of water.

Tin fo far endures the force of lead and antimony in the refiners teft, that it is hardly to be feparated from them, unlefs by the addition of copper: it adheres to the reft of the metals with greater eafe than any other, and hence it is in continual ufe in covering plates of iron, and lining copper, and other metals, to prevent their rufting; and to fave the liquids put into them from taking up any bad qualities from thofe metals, as it is with much more difficulty diffolved by common menftruums, than either of them.

Tin, in many things, greatly approaches to the nature of filver. It very readily melts with filver, gold, or copper; when the mixture is made with equal, or even a lefs quantity, it renders them extremely brittle: but it is very fingular, that if it be mixed in a much larger quantity, they ftill continue pliant and flexile. Ten parts of tin, and one of copper, make a mafs more rigid, indeed, than tin, yet malleable and ductile. Silver, of all the metals, fuffers moft by an admixture of tin, a very fmall quantity of it ferving to make that metal as brittle as glafs, and what is worfe, being very difficultly feparated from it again. The addition of about one-tenth part of copper to tin makes it fit for the common ufes of life, in veffels of various kinds, as it becomes, by the mixture, more durable; a little zink, added to this mixture, gives the metal a yellow colour, and, as it is mixed in greater or lefs quantity, makes it fit for cafting of cannon, and for bells.

Iron readily mixes with tin, in fufion, if the fire be brifk, and the iron be heated white hot before the tin be added. Twice the quantity of this metal, added to iron fo heated, readily runs with it into an odd fubftance, which is very white and brittle, and readily anfwers to the magnet. This has been ufed by fome as a pretence of its not being iron, and that the loadftone would attract another metal befide that: but the fallacy is eafily difcovered by one that underftands any thing of metallurgick analyfis.

Lead bears a confiderable admixture of tin, without being affected as gold and filver are, which are both rendered brittle by it; at leaft, its effects, on this metal, are in a much fmaller degree. The very vapour of tin has the fame effect with the metal itfelf on filver, gold, and copper, rendering them brittle. Mr. Comy, a metallurgift, has been long plagued by thefe vapours, by a piece of tin being accidentally among his charcoal; the confequence of which has been, that, till it was burnt wholly away, thofe metals have been rendered as brittle as glafs under the hammer, by only being fufed over thofe coals. It is owing to this property of tin, in making the metals it is mixed with brittle, that it renders them fonorous. Mr. Boyle has expreffed a wonder that tin, which is itfelf not much fonorous, fhould on mixture with copper render it more fo; but, if we confider that the fame fort of difpofition of parts which renders metals rigid and brittle, renders them fonorous, the myftery is explained.

The proper folvent of tin in its true malleable ftate is aqua regia. It will not well diffolve in any of the other menftrua of the ftronger kinds, nor indeed very readily in this. We are not, however, to wonder at this difficulty of folution in tin, fince we find it contains much more fulphur than any other metal, and fulphur is not one of thofe fubftances that are to be diffolved by acids. That this is a fact we find by putting calcined tin, inftead of common malleable tin, into the menftruum, for in this cafe even vinegar will diffolve it. While tin is in its malleable ftate, the weakeft acids diffolve it beft: verjuice, and it is faid even four apples boiled in tin veffels, acquire a tafte of that metal, though the ftrongeft acids, aqua regia excepted, boiled in the fame veffels, acquire no flavour from it at all.

There is fomething very fingular in the great gravity of tin ore beyond that of the ores of other metals; but it contains fo much arfenick, and is fo dangerous to the perfon who works it, that experiments are not expected to be made very frequently on it. The tin ores in general are ftubborn and refractory in the fire; it is eafy, however to find whether an ore does contain this metal or not; for, if a piece of it be powdered and wafhed, and afterwards fprinkled thinly over an iron plate made white hot on the fire, the tin ore in this cafe, if there be any in the mafs, will be found in little parcels of a red colour, covered with grey flowers of an arfenical fmell. The various kinds of mundick common in the Cornifh mines are not only rejected from the works as ore themfelves, but they are carefully feparated from among the other ores of a better kind, as they are apt to be very troublefome, even in the fmalleft quantities, in working the reft. They then pound and wafh the ore, and when they have thus feparated all the lighter impurities, till there is no longer any fmell of fulphur or of garlick, they grind it to a tolerable fine powder, and, after wafhing it again, it is carried to the melting-houfes, where it is melted into metal by mixing it with charcoal, and urging the fire to the utmoft violence by the blaft of large bellows. There is a cavity at the bottom of the furnace, into which the metal runs as it feparates from the ore, and out of which they let it by an aperture clofed and opened at pleafure; running it into cakes or pigs, which are the large blocks we fee it in.

Tin ore in general contains a great quantity of arfenick, which difcovers itfelf in the roafting in form of a white cloud, and which it is very material to burn quite away, as it otherwife renders the metal brittle. Charcoal alone commonly ferves for fluxing the ore of tin, but if any be found very refractory, a little common black pitch is an excellent addition.

Tin is a metal defcribed by the Greeks under the name of caffiteros. The Latins, who took it for a kind of lead, called it plumbum candidum, calling the common lead plumbum nigrum. The Arabian writers call it alanoe or alaferub. The chymifts call it jupiter, and all the preparations of it joviales. The character they ufe to exprefs it is ♃, by which they mean to denote that it is one half filver or luna, and the other half corrofive, which they exprefs by the crofs added to the crefcent. Mr. Boyle indeed was of opinion, that tin and filver were the fame metal, only that in the ftate of filver it was pure, and in that of tin debafed, by the admixture of fome corrofive matter not to be feparated from it.

The virtues of tin, as a medium given internally, have been greatly celebrated by many of the ancient writers, but it has lefs credit at prefent. We have been told that in difeafes of the lungs, and in diforders of the head and uterus, there is fcarce any thing equal to it; and that in convulfions, epilepfies, and the madnefs arifing from the bite of a mad dog, it was a certain remedy. Thefe laft are the only cafes in which it has any degree of credit at prefent, and that is rather among the vulgar than the phyficians. In epilepfies we have known half a drachm given twice a day for a long time, but without fuccefs. In the bite of a mad dog, great cures of the preventative kind have been faid to be wrought by it; but it is not eafy to fay, before the fymptoms in that terrible cafe appear, whether the poifon took effect or not.

In the manufactories it is of a great ufe in foldering, and, when amalgamated with mercury, and a little bizmuth added to make it run thin, it ferves in the filvering of looking-glaffes. By calcination it makes a foft powder called putty, which is of ufe in the polifhing glafs and gems, and alfo in making of enamels.

Its preparations in ufe in medicine, or generally kept in the fhops, are thefe: 1. The ftannum pulveratum, or powdered tin. 2. The fal jovis, or falt of tin. 3. The diaphoreticum joviale, or antihectick of Poterius. And, 4. The aurum mufivum, or, as it is commonly called, Mofaicum, Mofaick gold.

To thefe preparations ufed in medicine, we may add one well known as a cofmetick: it is a magiftery of tin prepared in the manner of that of bifmuth, by firft mixing fix ounces of fpirit of nitre with one ounce of fpirit of fea-falt, and then putting tin into this liquor, or aqua-regia, till it is capable of holding no more: laftly, pour the folution into fix or eight quarts of fpring-water, and the tin will be precipitated in form of a white powder, which fhould be wafhed feveral times, and then dried for the ufe of ladies in pomatums, to render the fkin white and foft.

TINCTORUM Rubia. See Madder.

TINCTURE, in pharmacy and chymiſtry, a ſeparation of the finer and more volatile parts of a mixed body, made by means of a proper menſtruum diſſolving and retaining the ſame.

Tincture, in heraldry, the hue or colour of any thing in coat armour, under which denomination may be alſo included the two metals, or and argent, becauſe they are often repreſented by yellow and white.

TINNING, the covering or lining any thing with melted tin, or with tin reduced to a very thin leaf.

TINNITUS Auris, tingling or buzzing of the ear, a diſeaſe pretty frequent in the ear, conſiſting in the proportion of a ſound which is not, or at leaſt is not external.

This perception is occaſioned by the beating of an artery in the ear, by an inflammation, or abſceſs of the tympanum or the labyrinth, by the admiſſion of foreign bodies, by commotions of the cranium, blows on the ears, &c. Extraordinary and irregular motions of the animal ſpirits are alſo found to occaſion the tinnitus, as we find in deliriums, phrenſies, vertigoes, &c. The tingling of the ear is one of the diagnoſtick ſigns of the plague.

TIPSTAVES, officers appointed by the marſhal of the King's-Bench, to attend the judges with a rod or ſtaff tipped with ſilver, and take charge of ſuch priſoners as are either committed or turned over at the judge's chambers.

TIRE, or, as the ſeamen pronounce it, teer, are many things of one denomination placed regularly in a row, as guns, caſks, &c.

TITHES, Tythes, *Tenths*, *Decimæ*, or *Dixens*, the tenth part of all profits or fruits, both predial, perſonal, and mixed, allotted to the clergy for their maintenance.

Of tithes there are three kinds, viz. perſonal, predial, and mixed.

Perſonal Tithes, are thoſe due or accruing from the profits of labour, art, trade, navigation, and induſtry of man.

Predial Tithes, thoſe which ariſe either from the fruits of the ground, as corn, hay, underwood, flax, hemp, &c. or from the fruits of trees, as apples, pears, plumbs, cherries; or from the produce of the garden.

Mixed Tithes, are ſuch as ariſe from beaſts and other animals fed with the fruits of the earth; as cheeſe, milk, wool, lambs, calves, fowls, &c.

Predial Tithes, again, are either great or ſmall.

Great Tithes, are thoſe of corn, hay, and wood.

Small Tithes, are thoſe of flax which are predial; and thoſe of wool, milk, cheeſe, lambs, ferrets, &c. which are mixed.

Impropriated and *appropriated* Tithes, called alſo infeodated tithes, are thoſe alienated to ſome temporal or eccleſiaſtical lord, united to their fee, and poſſeſſed as ſecular goods.

TITHING, *Decima*, or *Decury*; a number or company of ten men, with their families, knit together in a kind of ſociety, and all bound to the king for the peaceable behaviour of each other.

TITHYMALUS. See Spurge.

All the kinds of ſpurge are full of a milky cauſtick juice, which is dangerous to take inwardly; it is by ſome outwardly applied to take off warts and hairs, but it ſhould be uſed very cautiouſly.

TITALLATION, *Titillatio*, the art of tickling, i. e. exciting a ſort of pleaſurable idea, by a gentle application of ſome ſoft body, upon a nervous part; and which uſually tends to produce laughter.

TITLE, *Titulus*, an inſcription put over any thing to make it known. The word is more particularly uſed for the inſcription in the firſt page of a book expreſſing the ſubject thereof, the author's name, &c.

Title, *Titulus*, in the civil and canon law, denotes a chapter or diviſion of a book.

Title, is alſo an appellation of dignity, diſtinction, or pre-eminence, given to perſons poſſeſſed of the ſame.

Title, is alſo a certain quality aſcribed by way of reſpect to certain princes, &c.

Title, in law, denotes a right which a perſon has to the poſſeſſion of any thing.

It is alſo an authentick inſtrument, whereby a man can prove and make appear his right.

Title, in the canon law, is that by virtue whereof a beneficiary holds a benefice: ſuch is the collation of an ordinary, or a proviſion in the court of Rome, founded on a reſignation, permutation, or other legal cauſe.

Title, is alſo uſed in ſeveral ancient ſynods and councils for the church, to which a prieſt was ordered, and where he was conſtantly to reſide.

TITUBATION, a kind of libration or ſhaking, which the ancient aſtronomers attributed to the cryſtalline heaven, to account for certain inequalities which they obſerved in the motion of the planets.

TITULAR, or Titulary, denotes a perſon inveſted with a title, in virtue whereof he holds an office or benefice, whether he perform the functions thereof or not.

Titular, is ſometimes alſo applied adjectively to a perſon who has the title and right of an office or dignity, but without having poſſeſſion or diſcharging the function thereof.

TMESIS, in grammar, a figure whereby a compound word is ſeparated into two parts, and one or more words interpoſed between them.

TOBACCO, or Tabacco, a medicinal herb, not known in Europe till after the diſcovery of America by the Spaniards, and firſt imported about the year 1560.

The Americans on the continent call it petum, thoſe of the iſlands yoli. The Spaniards, who gave it the name tobacco, took it from Tobaco, a province of Yucatan, where they firſt found it, and learned its uſe

Tobacco is cultivated in ſeveral parts of America, particularly in the Caribbee iſlands, Virginia, &c. where they are forced to mix aſhes with the ſoil, to prevent its riſing too thick. After ſowing, they water it every day, and on very hot days cover it up, to prevent its being ſcorched by the ſun.

Beſides the tobacco of the W. Indies, there are conſiderable quantities cultivated in the Levant, the coaſts of Greece and the Archipelago, the iſland of Malta and Italy. The mark of good twiſt tobacco, are a fine ſhining cut, an agreeable ſmell, and that it have been well kept.

TOD *of Wool*, is mentioned in ſtatute 12 Car. II. c. 32, as a weight containing 28 pounds, or two ſtone. Some will have the word derived from the French tollet, a wrapper, within which, by uſage, two ſtone of wool is folded.

TOES, called by anatomiſts, digiti pedis, are the extreme diviſions of the feet, anſwering to the fingers of the hand.

TOGA, in antiquity, a wide woollen gown or mantle without ſleeves, uſed among the Romans both by men and women.

Jus Togæ, or privilege of the toga, was the ſame with the privilege of a Roman citizen, i. e. the right of wearing a Roman habit, and of taking, as they explain it, fire and water through the Roman empire.

TOILS, ſnares or nets uſed by hunters for catching wild beaſts, as deer, &c.

TOILET, a fine cloth of linen, ſilk, or tapeſtry, ſpread over the table in a bed-chamber or dreſſing-room, to undreſs and dreſs upon.

TOISE, a French meaſure containing ſix of their feet, or a fathom.

TOISON d'or, a term, in heraldry, for a golden fleece, which is ſometimes borne in a coat of arms.

TOLERATION, in religion, a term which has made a great figure in the diſputes among proteſtants who have been exceedingly divided about the meaſures of toleration, or the degrees to which hereticks and ſchiſmaticks are, or are not to be ſuffered.

TOLL, in law, a tax or cuſtom paid for paſſage, or for the liberty of ſelling goods in a market or fair. Hence, toll-booth, is a place in a town where goods are weighed, in order to aſcertain the duties thereon.

TOMB, includes both the grave or ſepulchre wherein a defunct is interred, and the monument erected to preſerve his memory.

TOME, a bound book or writing that makes a juſt volume.

TOMENTUM, properly ſignifies flocks or locks of wool; but by botaniſts is uſed for that ſoft downy matter which grows on the leaves of ſome plants, hence denominated tomentoſe; as gramen tomentoſum, carduus tomentoſus.

TONE, or Tune, in muſick, a property of ſound whereby it comes under the relation of grave and acute; or the degree of elevation any ſound has from the degree

of swiftness of the vibrations of the parts of the sonorous body. See TUNE.

TONGUE, *Lingua*, in anatomy, the principal instrument of speech.

The tongue is divided into the basis and point, the upper and under sides, and the lateral portions or edges. The basis is the posterior, or thicker part; the point, the anterior and thinnest part. The upper side is not quite flat, but a little convex, and divided into two lateral halves, by a shallow depressed line called linea lingua mediana. The edges are thinner than the other parts, and a little rounded as well as the point. The lower side reaches only from the middle of the length of the tongue to the point.

The tongue is principally composed of very soft fleshy fibres, intermixed with a peculiar medullary substance, and disposed in various manners. Many of these fibres are confined to the tongue without going any further; the rest form separate muscles which go out from it in different ways, and are inserted in other parts: all the upper side of the tongue is covered by a thick membrane of a papillary texture, upon which lies another very fine membrane like a kind of epidermis, which is likewise continued over the lowest side, but without papillæ.

The fleshy fibres of which the tongue is composed, and which go no further than the tongue, may be termed musculi linguæ interiores, or the intrinsick muscles; and they are the same with what Spigelius named musculi linguales. The fibres these muscles consist of are of three general kinds, longitudinal, transverse, and vertical; and each of these situations admits of different degrees of obliquity. The longitudinal fibres point to the basis and apex of the tongue, and seem partly to be expansions of the musculi stylo-glossi, hyo-glossi, and genio glossi. The vertical fibres seem likewise to be in part produced by the same genio-glossi, and the transverse by the mylo-glossi.

Besides these mixed productions, there is a distinct plane of longitudinal fibres, which run near the surface of the upper side of the tongue, and a distinct transverse plane under them. All these fibres are partly interwoven, one portion of them terminating at the two edges of the tongue, and the other at the basis and point without going to any other part; and they lie immediately above those which belong to the genio glossi. To discover all these different fibres, and their different degrees of direction, we need only cut the tongue longitudinally, after it has been boiled, or long macerated in strong vinegar. The extrinsick muscles, or musculi exteriores, are those which by one extremity make a part of the body of the tongue, and are fixed by the other in some part without the tongue. Of these we reckon four pairs, mylo-glossi, stylo-glossi, hyo-glossi, and genio-glossi.

TONICK, in medicine, is applied to a certain motion of the muscles, wherein the fibres, being extended, continue their extension in such a manner, as that the part seems immoveable, though in reality it be in motion.

TOOTH, *Dens*, in anatomy, a little hard smooth bone set in the gums, and serving to masticate or chew the food, &c.

The teeth are bony parts of the body, consisting of two substances; the one intensely hard, and as it were of a stony texture; and the other softer, but also of a bony nature. Internally, they are furnished with a certain cavity; they are fixed in the sockets of the maxillæ, by that particular species of articulation called gomphosis; and are destined for the purposes of mastication, articulation of the voice, and ornament.

The teeth, however, are not all fixed in their sockets by an equal number of roots; for the incisores are only secured by one. The canini have also but one, which, however, is deeper than those of the incisores, and larger in proportion to the strength of the canini. And, among the incisorii, the two in the middle are secured by deeper roots than the two lateral ones contiguous to the canini, because they are broader and larger. The dentes molares differ from each other with respect to their roots. The superior, and especially the two posterior, are sometimes fixed with three roots. But the inferior have only two, partly because the substance of the superior jaw is softer and less compact than that of the inferior, for which reason they could not be so securely fixed by two, as by three roots; and partly because the inferior press upon their roots by their own weight; whereas the superior are pendulous, and consequently require more roots to secure them. The other dentes molares, succeeding the dens caninus in the upper jaw, have two roots, and those in the inferior only one. Besides, it is to be observed, that the teeth of children are only furnished with imperfect soft, and as it were medullary roots; hence, they are generally loose, especially the incisores, which may be pulled out with one's nails, or by a piece of thread twisted about them. It is also to be observed, that the roots of the teeth are internally surrounded with membranous and nervous ligaments, by which the teeth are firmly secured in their sockets; and externally the teeth are encompassed by the substance of the gums, which are a kind of hard flesh, consisting of small fibrous laminæ, placed close to each other, and intermixed with a large number of blood-vessels; for which reason they are intensely red. They are, besides, liberally furnished with slender membranes, glands, and ramifications of nerves; hence, they derive their power of sensation, and are observed to be moistened with a due humidity. This flesh surrounds the teeth like a rampart, and fortifies them as muscles do. Hence, when it is either eat away or become preternaturally flaccid, the teeth generally become loose or drop out.

From a peccant nourishment proceed these concretions about the teeth and gums which are commonly called the tartar of the teeth. Helmont is of opinion that the gums supply the teeth with nourishment, and, when this nutritive juice is excrementitious and discharged from the injured gums, it indurates about the teeth, and assumes a degree of hardness almost equal to their own. But the tartareous matter adhering to the teeth seems to be produced partly from the saliva impregnated with the terrestrial, tartareous lymph of the gums, which by continually moistening the teeth, gradually adds viscid and tartareous particles to them.

This tartar, in consequence of its acrimony, gradually consumes the substance of the teeth, induces a blackness, and sometimes a caries. This tartareous substance is instantaneously resolved by being rubbed with spirit of salt, which is a proof that it consists of an alkaline earth. This disorder is generally most incident to infants, and children who feed upon viscid preparations of milk and sweet-meats, as also to scorbutick, arthritick, nephritick, and hypochondriack patients; because their serum abounds with impure, terrestrial, and tartareous parts. For this reason physicians ought carefully to inspect the teeth, because, by their state, that of the serum and lymph are most satisfactorily discovered.

Method of cleaning foul and black TEETH. Since by means of these yellow, blackish, and unseemly scales, which sometimes cover the teeth, the mouth is not only considerably deformed, and the breath made disagreeable, but also the teeth themselves rendered loose; it seems highly necessary to cleanse and deterge these rough and foul teeth with all expedition.

But, lest fresh scales and blackness should again deform and disorder the teeth, it is necessary always to have a good dentrifice in readiness, by which the teeth may be cleansed and rendered white and firm every sixth or seventh day; for rubbing the teeth too often, or with such substances as are too acrid, crude, and drastick, proves always as prejudicial as a total neglect of them. Thus the sharp powder prepared of pumice-stone, bricks, coral, the ashes of tobacco and other substances of a like nature too powerful, wears away and abrades the teeth. And spirits also, and more especially those of vitriol and salt, gradually corrode and consume them. The safest and most innocent dentrifices are prepared of milder substances, such as crabs-eyes, mother of pearl, calcined shells, calcined hartshorn, chalk, root of Florentine orris, myrrh, and other substances of a like nature, reduced to powder and mixed together. When the gums are less firm, we may commodiously add a few drops of the spirit of salt, or that of vitriol. The composition, for this purpose, may be prepared in the following manner: Take of calcined chalk, or red myrrh, of the roots of Florentine orris, and of calcined hartshorn, each one or two drachms, and of the spirit of salt, between three and six drops: mix and reduce to a fine powder to be kept for use.

Take of calcined shells and calcined mother of pearl each two drachms, of dragons-blood one drachm, and of

of Japan earth one fcruple: mix and reduce to a fine powder. In order to give thefe powders a grateful flavour, we may pour upon them either a few drops of oil of cinnamon, cloves, or rhodium. Afhes of tobacco, provided they are rarely ufed, are an excellent remedy for the blacknefs of the teeth, as is alfo the following preparation:

Take of plaintain-water one ounce, of the honey of rofes two drachms, and of the fpirit of falt 10 drops: mix all together.

TOOTH-ACH, a very painful diforder, caufed by an impure ferum which corrodes and rends the ligaments and nervo-glandulous coats, by which the teeth are kept firm in their fockets: its feat may alfo be in the cavity or internal parts of the teeth themfelves.

The whofe intenfion of cure, in this diforder, confifts in driving and diverting the impure fcorbutick ferum from the head, and then carrying it off by proper emunctories. This is to be done by faline, emollient, and purgative clyfters; by warm pedeluvia of rain-water and wheat-bran, with Venice foap, ufed juft before bed-time; by laxatives of manna and caffia diffolved in whey or affes milk, or mineral waters: if the patient is plethorick, or full of blood, phlebotomy in the foot will be proper, to drive the humours from the head. Sudorifick remedies are alfo proper, but more efpecially an electuary made of rob of elder-berries, burnt hartfhorn, diaphoretick antimony, and a few grains of nitre: or, an ounce of the rob may be taken in broth, to promote a diaphorefis; and it may be ufed externally, diffolved in beer, in the manner of a gargle, which will yield immediate relief to the patient.

When the patient is fubject to catarrhs, is fcorbutick or cachectick, then mineral waters are moft proper; and if the patient is of a weak bilious conftitution, the water fhould be mixed with affes milk.

Outwardly, may be applied bags, filled with paregorick and emollient fpecies; fuch as elder, melilot, and camomile flowers, bay and juniper berries, carraway and millet feeds, and decrepitated falt: they muft be laid on warm, and are very fafe. A drop or two of oil of cloves or box, applied to a carious tooth with cotton, are medicines not to be defpifed; and camphorated fpirits of wine, mixed with faffron, caftor, and opium, made into a liniment, and laid to the gums and hollow tooth, often gives the patient eafe.

When the tooth-ach proceeds from a rotten hollow tooth, it will be beft to burn the little nervous cord, which is the feat of the pain, with an acute cautery; and then the cavity may be filled up with a mixture of wax and maftich. But if this cannot be done, the only remedy left is to have the tooth drawn.

Allen advifes to rub the tooth that is painful with the root of the iris lutea, or the yellow fleur-de-luce; or a pill may be made of equal quantities of camphor or opium, and put into the hollow tooth; and, laftly, fome greatly recommend a fmall plafter of tacamalhack, laid on the fide of the face.

TOP-MASTS *of a Ship*, are four, which are made faft and fettled unto the heads of the main-maft, fore-maft, mizzen-maft, and bow-fprit, refpectively.

TOP-GALLANT-MASTS *of a Ship*, are two, viz. main-top-gallant-maft and fore-top-gallant-maft, which are fmall round pieces of timber, fet on their refpective top-mafts; on the top of which mafts are fet the flag-ftaffs, on which the colours, as flags, pendants, &c. hang.

TOPARCHY, a little ftate or feigniory confifting only of a few cities or towns; or a petty country governed and poffeffed by a toparch, or lord.

TOPAZ, in natural hiftory, a kind of gem, or precious ftone, the third in order after the diamond.

The topaz of the fhops is the fame ftone which our jewellers know by this name, but very different from what the ancients knew under the fame name: they called this ftone, from its golden colour, the chryfolite, or gold ftone.

The ancients have faid much of the topazes virtues; it is faid to be a high cordial and fudorifick, and to have been given, alfo, in hæmorrhages, with great fuccefs. But whatever virtues it may poffefs, we are not to expect to find them in the ftones our druggifts now keep under the name of topazes, thefe being no other than fragments of a yellowifh plated fpar, common in lead mines, and impregnated more or lefs with that metal. The topaz itfelf, feems to owe its colour to lead, but the quantity it contains of it is fo very inconfiderable, that it can be of no effect in the body, but may very well be fuppofed to leave it in the ftate of cryftal, which feems as much as we are to imagine, really, of any of the gems; but this fpar, fold in its place, not only difcovers that it holds a great deal of lead by its weight, but we have feparated lead from it, in no lefs a quantity than one-fifth of its weight.

TOPHUS, in medicine, a calcarious, or, rather, chalky fubftance, growing in any part of the body.

TOPICK, in rhetorick, a probable argument drawn from the feveral circumftances and places of a fact, &c.

TOPICE, *Topica*, expreffes the art or manner of inventing and managing all things of probable argumentations.

TOPICKS, or TOPICAL *Remedies*, are commonly ufed for what we otherwife call external remedies, i. e. fuch as are applied outwardly, to fome particular difeafed and painful part.

TOPOGRAPHY, a defcription or draught of fome particular place, or fmall tract of land, as that of a city or town, manor or tenement, field, garden, houfe, caftle, or the like; fuch as furveyors fet out in their plots, or make draughts of, for the information and fatisfaction of the proprietors.

TORE, *Torus*, in architecture, a large round moulding ufed in the bafes of columns.

TOREUTICE, that part of fculpture called turning.

TORIES, or TORYES, a party or faction in England, oppofite to the whigs.

TORMENTIL, in botany, a genus of the icofandria polygynia clafs. The calix confifts of eight fegments, and the corolla of four petals; the feeds are roundifh, naked, and fixed to a fmall dry receptacle. There are two fpecies, both natives of Britain, viz. the erecta, or tormentil; and the reptans, or creeping tormentil.

Tormentil-root has an auftere ftyptick tafte, accompanied with an aromatick flavour; it is one of the moft agreeable and efficacious vegetable aftringents.

TORMINA, in medicine, a term fometimes ufed to exprefs pain in general, but more particularly a fpecies of pain, called tormina ventris, or alvi; in Englifh, the gripes.

TORNADO, or TURNADO, a fudden and vehement guft of wind from all points of the compafs, frequent on the coaft of Guinea. See HURRICANE.

TORPEDO, the cramp or numb fifh, in ichthyology, a fpecies of raia, the body of which is perfectly fmooth, and confiderably broad in proportion to its length; the roftrum, or fnout, is oblong and fubacute; the back is fomewhat gibbofe; the belly is flat, and the fides are terminated by broad fins; its colour on the back is a dufky greyifh, and the belly is white.

The moft fingular property of this fifh is, that, when out of the water, it affects the hand or other part that touches it, with a fenfation much like that which we call the cramp; the fhock is inftantaneous, and refembles that given by electricity, only that the effect lafts longer: this is all the fifh can do; but thofe who have related it, have raifed the effects almoft into miracles. Reaumur has given a long memoir, wherein he endeavours to account for this fingular phænomenon, which he refolves into the inftantaneous action of a vaft multitude of fmall mufcles on the furface of the body of the fifh: but there feems fomething more required, in order to the perfectly explaining fo odd an effect.

TORQUE, in heraldry, denotes a round roll of cloth, twifted and ftuffed; fuch is the bandage, frequently feen in armouries, about the heads of Moors, &c.

It is always of the two principal colours of the coat; and is accounted the leaft honourable decoration worn on the helmet, by way of creft.

TORREFACTION, in chymiftry, is the roafting or fcorching of a body by the fire, in order to difcharge a part either unneceffary or hurtful in another operation; as fulphur is thus difcharged from an ore, before the metal can be obtained to advantage.

TORRENT, *Torrens*, in geography, denotes a temporary ftream of water, falling fuddenly from mountains, wherein there have been great rains, or an extraordinary thaw of fnow.

TORRICELLIAN-EXPERIMENT, a famous experiment made by Torricelli, a disciple of the great Gallileo, which is explained under BAROMETER.

TORRID ZONE, among geographers, denotes that tract of the earth lying upon the equator, and on each side as far as the two tropicks, or 23° 30′ of north and south latitude. The torrid zone was believed, by the ancients, to be uninhabitable; but is now well known to be not only inhabited by the natives of those hot climates, but even tolerable to the people of the colder climates, towards the north and south; the excessive heat of the day being there tempered by the coldness of the night.

TORTOISE, *Testudo*, in zoology. See TESTUDO.

TORTURE, a grievous pain inflicted on a criminal, or person accused, to make him confess the truth.

TOUCAN, in astronomy, a constellation of the southern hemisphere, consisting of eight small stars, and otherwise called Anser Americanus.

TOUCH-NEEDLE, among assayers, refiners, &c little bars of gold, silver, and copper, combined together in all the different proportions and degrees of mixture; the use of which is to discover the degree of purity of any piece of gold or silver, by comparing the mark it leaves on the touch-stone, with those of the bars.

The metals usually tried by the touch-stone, are gold, silver, and copper, either pure, or mixed with one another in different degrees and proportions, by fusion.

In order to find out the purity, or quantity of baser metal in these various admixtures, when they are to be examined, they are compared with these needles, which are mixed in a known proportion, and prepared for this use. The metals of these needles, both pure and mixed, are all made into laminæ, or plates, one-twelfth of an inch broad, and a fourth part of their breadth in thickness, and an inch and half long: these being thus prepared, you are to engrave on each a mark indicating its purity, or the nature and quantity of the admixture in it.

The black rough marbles, the basaltes, or the softer kinds of black pebbles, are the most proper for touch-stones.

Now, the method of using the needles and stone is this: the piece of metal to be tried, ought first to be wiped well with a clean towel, or piece of soft leather, that they may the better see its true colour; for from this alone an experienced person will, in some degree, judge before-hand what the principal metal is, and how, and with what, debased.

Then chuse a convenient, not over large, part of the surface of the metal, and rub it several times very hardly and strongly against the touch-stone, that in case a deceitful coat or crust should have been laid upon it, it may be worn off by that friction; this, however, is more readily done by a grind-stone, or small file, if you have them at hand. Then wipe a flat and very clean part of the touch-stone, and rub against it, over and over, the just mentioned part of the surface of the piece of metal, till you have, on the flat surface of the stone, a thin metallick crust, an inch long, and about an eighth of an inch broad: this done, look out the needle that seems most like to the metal under trial, wipe the lower part of this needle very clean, and then rub it against the touch-stone, as you did the metal, by the side of the other line, and in a direction parallel to it.

When this is done, if you find no difference between the colours of the two marks, made by your needle and the metal under trial, you may with great probability pronounce that metal and your needle to be of the same alloy, which is immediately known by the mark engraved on your needle. But if you find a difference between the colour of the mark given by the metal, and that by the needle you have tried, choose out another needle, either of a darker or lighter colour than the former, as the difference of the tinge on the touch-stone directs; and by one or more trials of this kind you will be able to determine which of your needles the metal answers, and thence what alloy it is of, by the mark of the needle; or else you will find that the alloy is extraordinary, and not to be determined by the comparison of your needles.

TOUR, a French term, frequently used for a journey or progress through one or more countries.

TOURNEFORTIA, in botany, a genus of plants, whose flower-cup is small, and divided into five segments: the corolla is monopetalous and funnel shaped, the tube of which is cylindrick and globular at the base, and the limb is divided into five acute segments, which spread open horizontally: the fruit is a globose succulent berry, containing four oblong oval seeds, separated by the pulp.

This genus is the same with the pittonia of Plumier.

TOURNEQUET, in surgery, an instrument made of rollers, compresses, screws, &c. for compressing any wounded part, so as to stop hæmorrhages.

TOWER, *Turris*, a tall building, consisting of several stories, usually of a round form, though sometimes square or polygonal.

TOWN, a place inhabited by a considerable number of people, being of a middle size between a city and a village.

TRACHEA, in anatomy, called also aspera arteria, and in English the wind-pipe, is a tube or canal, extended from the mouth to the lungs; its situation is in the middle and anterior part of the neck; and it is connected with the fauces, the lungs, and the œsophagus. Anatomists commonly divide it into two parts, the larynx, and aspera arteria properly so called. See LARYNX and ASPERA *Arteria*.

TRACHEOTOMY, in surgery, the name of an operation otherwise called BRONCHOTOMY, which see.

TRACT, in geography, an extent of ground, or a portion of the earth's surface.

TRACT, in matters of literature, denotes a small treatise, or written discourse, upon any subject.

TRACTION, the act of drawing, whereby a thing is brought nearer to the mover.

TRACTRIX, in geometry, a curve otherwise called catenaria. See CATENARIA.

TRADE, in general, denotes the same with commerce, consisting in buying, selling, and exchanging of commodities, bills, money, &c.

The first notions of trade arose from the light of nature. One family no sooner found that they could not live without the assistance of another, but they established a trade by way of barter. As the nations increased, markets were every where established for the same purpose, where a sheep was exchanged for a sack of corn, or an ox for some other necessaries of life. This introduced the use of weights and measures; but trade never became an art, till the invention of spinning and weaving, whose manufactures introduced a variety of dealing.

TRADE-WINDS, denote certain regular winds at sea, blowing either constantly the same way, or alternately this way and that; thus called from their use in navigation, and the Indian commerce.

The trade-winds are of different kinds, some blowing three or six months of the year one way, and then the like space of time the opposite way; these are very common in the Indian seas, and are called monsoons, which see. Others blow constantly the same way; such is that general wind between the tropicks, which off at sea, is found to blow all day long from east to west.

TRADESCANTIA, Virginia spider-wort, in botany, the root of which is perennial, and is propagated by sowing its seeds when ripe. This is the same with the ephemerum of Tournefort.

TRADITION, among ecclesiastical writers, denotes certain regulations regarding the rites, ceremonies, &c. of religion, which are supposed to have been handed down from the days of the apostles to the present time.

Tradition is distinguished into *written*, whereof there are some traces in the writings of the ancient fathers; and *unwritten*, or *oral*, whereof no mention is made in the writings of the first ages of Christianity.

TRAGACANTHA, goats-thorn, in botany, a genus of plants, whose flower is papilionaceous; the vexillum is long, erect, indented at the point, and the borders reflexed; the wings are oblong, and shorter than the vecillum, and the carina is the length of the wings, and emarginated; the stamina consists of 10 filaments, nine of which are joined together, these are topped with roundish antheræ; the fruit is a short swelling pod, having two longitudinal cells, which contain kidney-shaped seeds.

Gum-tragacanth, or, as some call it, gum-adragant, or gum-dragon, is the produce of this shrub, which grows to about four feet high, and has a firm and robust stem, with numerous branches.

TRAGEA, in pharmacy, an aromatick powder, grofsly beaten and mixed with fugar, taken by way of carminative.

TRAGEDY, a dramatick poem, reprefenting fome fignal action performed by illuftrious perfons, and which has frequently a fatal iffue, or end.

Ariftotle, more fcientifically, defines tragedy, the imitation of one grave and entire action, of a juft length, and which, without the affiftance of narration, by raifing of terror and compaffion, refines and purges our paffions. This definition has given the criticks fome perplexity; and Corneille declares he cannot reconcile Ariftotle with himfelf: the inftances Ariftotle cites, he thinks, ruin his own definition; he even denies the purging our paffions to be the end of tragedy. Our Englifh authors are more favourable to the definition; by the purging our paffions, they underftand not the extirpating them, but the reducing them to juft bounds; for by fhewing the miferies that attend a fubjection to them, it teaches us to watch them more narrowly; and by feeing the great misfortunes of others, it leffens the fenfe of our own.

Tragedy, in its original, M. Hedelin obferves, was only a hymn fung in honour of Bacchus, by feveral perfons, who, together, made a chorus of mufick, with dances and inftruments. As this was long, and might fatigue the fingers, as well as tire the audience, they bethought themfelves to divide the finging of the chorus into feveral parts, and to have certain recitations in the intervals. Accordingly Thefpis firft introduced a perfon upon the ftage with this view. Æfchylus, finding one perfon infufficient, introduced a fecond, to entertain the audience more agreeably, by a kind of dialogue: he alfo cloathed his perfons more decently, and firft put on them the bufkin.

The perfons who made thefe recitations on the fcene, were called actors; fo that tragedy was at firft without actors. And what they thus rehearfed, being things added to the finging of the chorus, whereof they were no neceffary part, were called epifodes.

Sophocles found that two perfons were not enough for the variety of incidents, and accordingly introduced a third; and here the Greeks feemed to have ftopped; at leaft, it is very rare that they introduced four fpeakers in the fame fcene.

Tragedy and comedy were, at firft, confounded with each other, but were afterwards feparated; and the poets applied themfelves to the cultivating of tragedy, neglecting comedy.

When tragedy was got into a better form, they changed the meafure of its verfe, and endeavoured to bring the action within the compafs of a day, or of a revolution of the fun.

The Englifh received the firft plan of their drama from the French, among whom it had its rife towards the end of Charles V. under the title of chant-royal, which confifted of pieces in verfe, compofed in honour of the Virgin, or fome of the faints, and fung on the ftage: they were called by the title of chant-royal, becaufe the fubject was given by the king of the year, or the perfon who had borne away the prize the year preceding.

The humour of thefe pieces ran wonderfully among the people, infomuch that in a little time there were formed feveral focieties, who began to vie with each other: one of thefe, to engage the town from the reft, began to intermix various incidents or epifodes, which they diftributed into acts, fcenes, and as many different perfons as were neceffary for the reprefentation. Their firft effay was in the Bourg St. Maur, and their fubject the paffion of our Saviour. The provoft of Paris prohibiting their continuing of it, they made application to court; and to render it the more favourable to them, elected themfelves into a friary or fraternity, under the title of brothers of the paffion: which title has given fome occafion to fufpect them to have been an order of religious. The king, on feeing and approving fome of thefe pieces, granted them letters of eftablifhment, in 1402; upon which they built a theatre, and for an age and a half acted none but grave pieces, till, the people growing weary of them, they began to intermix farces, or interludes, from prophane fubjects.

The mixing of farce and religion difpleafing many, they were re-eftablifhed by an arret of parliament, in 1548; on condition of their acting none but proper, lawful, and decent fubjects, without intermeddling with any of the myfteries of religion; and thus were the brothers of the paffion defpoiled of their religious character: upon which they mounted the ftage no more in perfon, but brought up a new fet of comedians, who acted under their direction.

Thus was the drama eftablifhed, and on this foundation arrived in England. In procefs of time, as it was improved, it became divided into two branches, agreeable to the practice of the ancients, and the nature of things, viz. into tragedy and comedy, properly fo called; and this laft again was fubdivided into pure comedy and farce.

TRAGI-COMEDY, a dramatick piece partaking of the nature both of tragedy and comedy, the event whereof is not bloody or unhappy, and wherein is admitted a mixture of lefs ferious characters.

The foundation of tragi-comedy is certainly bad; for endeavouring to make us laugh and cry by turns, it endeavours at contrary motions, which the heart can never undergo; every thing that difpofes for the one, indifpofing for the other: for which reafon it is at prefent, with great juftice, difufed. However, tragi-comedy is the only way wherein comedy is allowed to introduce kings and heroes.

TRAGOPOGON, goats-beard, in botany, a genus of plants, whofe flower is compound, imbricated, and uniform, confifting of a number of ligulated flofcules, quinquedentated at the ends; there is no pericarpium, but the feeds, which are oblong, angulated, rough, and crowned with a plumofe down, are contained in the cup, and placed on a fcabrous, naked, flat receptacle.

This genus includes the falfafy.

TRAGOSELINUM, in botany, Tournefort's name for the pimpinella of Linnæus.

TRAGUS, in anatomy, one of the protuberances of the auricle, or external ear, called alfo hircus, becaufe ufually hairy. The tragus is that protuberance next the temple: that on the oppofite fide, to which the foft lobe of the ear is annexed, is called the antigragus. See EAR.

TRAJAN COLUMN, a famous hiftorical column erected in Rome, in honour of the emperor Trajan. It is of the Tufcan order, though fomething irregular; its height is eight diameters, and its pedeftal Corinthian: it was built in a large fquare there, called Forum Romanum. Its bafe confifts of 12 ftones of an enormous fize, and it is raifed on a focle, or foot of eight fteps; within-fide is a ftair-cafe, illuminated with 44 windows. It is 140 feet high, which is 35 fhort of the Antonine column, but the workmanfhip of the former is much more valued. It is adorned from top to bottom with baffo relievos, reprefenting the great actions of that emperor againft the Dacæ.

TRAJECTORY *of a Comet*, is its path or orbit, or the line it defcribes in its motion. See COMET.

TRAIL-BOARD, in a fhip, a carved board on each fide of her beak, which reaches from the main ftem to the figure, or the brackets.

TRAIN, the attendance of a great perfon, or the trail of a gown, or robe of ftate.

In falconry, it denotes the tail of an hawk.

TRAIN, for the number of beats which a watch makes in an hour, or any other certain time.

TRAIN, is alfo ufed for a line of gun-powder, laid to give fire to a quantity thereof, in order to do execution by blowing up earth, works, buildings, &c.

TRAIN, or TRAILE *of Artillery*, includes the great guns, and other pieces of ordnance belonging to an army in the field. See CANNON.

TRAIN-OIL, the oil procured from the blubber of a whale by boiling.

TRAIN-BANDS, or TRAINED-BANDS, a name given to the militia of England.

TRAINING, or TRACING, in mineralogy, a term ufed by the miners, to exprefs the tracing up the mineral appearances on the furface of the earth to their head, or original place, and there finding a mine of the metal they contain. See MINE.

TRAMBLING *of Tin Ore*, among miners, the wafhing it very clean, which is done in a fhovel, and in a frame of boards. See TIN.

TRAMEL, an inftrument, or device, fometimes of leather,

leather, more usually of rope, fitted for a horse's legs, to regulate his motions, and form him to an amble. It is also taken in many places for an iron moveable instrument in chimnies to hang pots over the fire.

TRANSACTION, *Transactio*, in the civil law, an accommodation of some business, or dispute between two parties, by a mutual and voluntary agreement between them. See ACCOMMODATION.

Philosophical TRANSACTIONS, a kind of journal of the principal things that come before the Royal Society. See SOCIETY.

TRANSCENDENTAL, or TRANSCENDANT, something elevated, or raised above other things; which passes and transcends the nature of other inferior things.

TRANSCENDENTAL *Quantities*, among geometricians, are indeterminate ones, or such as cannot be fixed or expressed by any constant equation: such are all transcendental curves, which cannot be defined by any algebraick equation: or which, when expressed by any equation, one of the terms thereof is a variable quantity.

TRANSCRIPT, a copy of any original writing, particularly that of an act, or instrument, inserted in the body of another.

TRANSFER, in commerce, &c. an act whereby a person surrenders his right, interest, or property, in any thing moveable or immoveable to another.

The term transfer is chiefly used for the assigning and making over shares in the stocks, or publick funds, to such as purchase them of the proprietors.

TRANSFORMATION, in general, denotes a change of form, or the assuming a new form different from a former one.

The chymists have been for a long time seeking the transformation of metals; that is, their transmutation, or the manner of changing them into gold. See the article TRANSMUTATION.

TRANSFORMATION *of Equations*. The doctrine of the transformation of equations, and of exterminating their intermediate terms, is thus taught by Mr. MacLaurin. The affirmative roots of an equation are changed into negative roots of the same value, and the negative roots into affirmative, by only changing the signs of the terms alternately, beginning with the second. Thus, the roots of the equation, $x^4-x^3-19x^2+49x-30=0$, are $+1$, $+2$, $+3$, $+4$, -5; whereas the roots of the same equation having only the signs of the second and fourth terms changed, viz. $x^4+x^3-19x^2$ $49x-30=0$, are -1, -2, -3 $+5$.

TRANSFUSION, *Transfusio*, the act of pouring a liquor out of one vessel into another.

TRANSFUSION *of the Blood*, in surgery, the conveying of the arterial blood of one man, or animal, into the veins of another.

The generality of physicians, not without reason, attribute most disorders of the body to some vice in the blood; and, therefore, some were led to think, that no method could be more ready to remove and correct that vice, than injecting a proper medicine in the veins to mix with the blood itself, or the transfusing the sound blood of one animal into the veins of another, instead of that which is diseased. But, notwithstanding the vast expectations which had been formed by physicians from this operation, frequently the event turned worse than the disease; for we are told, that almost all the patients who have been treated this way, degenerated into a stupidity, foolishness, or a raving, or melancholy madness, or have been taken off with a sudden death, either in, or not long after, the operations.

For the transfusion of blood into the veins, first, a vein is to be opened in the patient's arm, or hand, and then a small tube of silver, brass, or ivory, thrust upward into it: the same is to be done with the sound person, only the tube must here be inserted downward, toward the small end of the vein; this done, the smallest of the tubes is to be inserted into the other larger one; by which means, as much blood will pass from the sound person into the patient as may be thought proper, and then the incised veins are to be dressed, or bound up, as in bleeding: if the patient does not recover after the first transfusion, the operation should be repeated again, at convenient intervals; but before the patient receives the blood of the sound person, he ought to be bled proportionably, that the new blood last received may have the freer circulation. Sometimes a vein is opened in each arm of the patient at the same time, that as much of the vitiated blood may flow out of one orifice, as he receives of the sound by another.

If the blood is to be transfused out of some animal into the patient, then a calf or a lamb, for example, is to be secured by ligatures, and one of their veins or arteries opened in the neck, leg, or thigh, and the rest of the operation managed as before.

TRANSIT, *Transitus*, in astronomy, signifies the passage of any planet, just by, or over a fixed star, or the sun, and of the moon in particular, covering or moving over any planet.

TRANSITION, in musick, is when a greater note is broken into a less, to soften the roughness of a leap by a gradual passage to the next note following; whence it is commonly called the breaking of a note.

TRANSITION, in rhetorick, is of two sorts; the first is when a speech is introduced abruptly, without express notice given of it; as when Milton gives an account of our first ancestor's evening devotions:

> Both turn'd, and under open sky ador'd
> The God that made both air, sky, earth, and heav'n.—
> —Thou also mad'st the night,
> Maker omnipotent, and thou the day!

The second sort of transition is, when a writer suddenly leaves the subject he is upon, and passes unto another, from which it seems different at first view, but has a relation and connection with it, and serves to illustrate and enlarge it.

TRANSITIVE, in grammar, an epithet applied to such verbs as signify an action which passes from the subject that does it, to or upon another subject which receives it. Under the head of verbs transitive, come what we usually call verbs active and passive; other verbs, whose action does not pass out of themselves, are called neuters, and by some grammarians, intransitives.

TRANSLATION, the act of transferring or removing a thing from one place to another; thus we say, the translation of a bishop's see, a council, a seat of justice, &c.

TRANSLATION, is also used for the version of a book, or writing, out of one language into another.

TRANSMARINE, something that comes from, or belongs to, the parts beyond sea.

TRANSMIGRATION, the removal or translation of a whole people into another country, by the power of a conqueror.

TRANSMIGRATION, is particularly used for the passage of a soul out of one body into another, being the same with what we otherwise call metemphsychosis. See METEMPSYCHOSIS.

TRANSMISSION, in opticks, &c. the act of a transparent body passing the rays of light through its substance, or suffering them to pass: in which sense, the word stands opposed to reflection.

Transmission is also frequently used in the same sense with refraction, by which most bodies, in transmitting the rays, do also refract them. The rays of light, Sir Isaac Newton observes, are subject to fits of easy transmission and reflection. See LIGHT.

For the cause of transmission, or the reason why some bodies transmit, and others reflect the rays. See the articles OPACITY and TRANSPARENCY.

TRANSMUTATION, the act of transforming or changing one nature into another.

Nature, Sir Isaac Newton observes, seems delighted with transmutations: he goes on to enumerate several kinds of natural transmutations; gross bodies, and light, he suspects, may be mutually transmuted into each other; and adds, that all bodies receive their active force from the particles of light which enter their composition. For all fixed bodies, when well heated, emit light as long as they continue so; and again, light intermingles itself, and inheres in bodies, as often as its rays fall on the solid particles of those bodies. Again, water, which is a fluid, volatile, tasteless salt, is by heat transmuted into a vapour, which is a kind of air; and by cold, into ice, which is a cold transparent brittle stone, easily dissolvable, and this stone is convertable again into water by heat, as vapour is by cold.

Earth, by heat, becomes fire; and by cold, is converted

verted into earth again: dense bodies, by fermentation, are rarified into various kinds of air; and that air, by fermentation also, and sometimes without, reverts into gross bodies. Quicksilver sometimes puts on the form of a fluid metal, sometimes it appears in shape of a pellucid fragile salt, called sublimate; sometimes of a pellucid, volatile, white, tasteless earth, called mercurius dulcis; by distillation, it becomes vapour; and by agitation in vacuo, it shines like fire, &c.

All bodies, beasts, fishes, insects, plants, &c. with all their various parts, grow and increase out of water, and aqueous and saline tinctures; and by putrefaction, all of them revert into water or an aqueous liquor again. Farther, water exposed a while to the open air, puts on a tincture, which, in process of time, has a sediment and a spirit, and before putrefaction, yields nourishment both for animals and vegetables.

TRANSMUTATION, in alchemy, denotes the art of changing or exalting imperfect metals into gold or silver.

This is also called the grand operation, and they say, is to be effected with the philosopher's stone.

Some alchemists hold, that the transmutation should rather be called the perfection of imperfect metals; as holding all metals, intended by nature to arrive equally at the perfection of gold, in as much as they are composed of the same matter; and that it is only the impurity of their matrices, that is, in the place wherein they are formed by nature, that has prevented their arriving thereat. The elixir being projected on any of these metals, it is supposed to purge and seperate the impure parts from the pure, and to join itself wholly to the mercury (which is the purest part) as being of the same nature.

Whether metals may be transmuted into one another, or not, is a point strongly disputed among philosophers; the alchemists strenuously asserting the affirmative.

TRANSMUTATION, in geometry, denotes the reduction or change of one figure, or body, into another of the same area or solidity, but of a different form; as a triangle into a square, a pyramid into a parallelopiped, &c.

In the higher geometry, transmutation is used for the converting a figure into another of the same kind and order, whose respective parts rise to the same dimensions in an equation, admit of the same tangents, &c.

If a rectilinear figure be transmuted into another, it is sufficient that the intersections of the lines which compose it, be transferred, and the lines drawn through the same in the new figure. If the figure to be transmuted be curvilinear, the points, tangents, and other right-lines, by means whereof the curve line is to be defined, must be transferred.

TRANSOM, among builders, denotes the piece that is framed across a double light window. See WINDOW.

TRANSOM, among mathematicians, signifies the vane of a cross-staff, or a wooden number fixed across, with a square whereon it slides, &c. See CROSS-STAFF.

TRANSOM, in a ship, a piece of timber which lies athwart the stern, between the two fashion-pieces, directly under the gun-room port.

TRANSPARENCY, *Diaphaneity*, in physicks, a quality in certain bodies whereby they give passage to the rays of light; in contradistinction to opacity, or that quality of bodies which renders them impervious to the rays of light. See OPACITY.

TRANSPIRATION, the insensible, or almost insensible passage of an excrementitious matter through the pores of the skin, called also perspiration.

TRANSPIRATION, is also used by some authors for the ingress or entrance of the air, vapour, &c. through the pores of the skin into the body.

Cardan, by this kind of transpiration, accounts for the prodigy of a woman, whose daily urine weighed 27 pounds, though all the food she took, both dry, and liquid, did not exceed four pounds.

Dr. Baynard also suspects some such transpiration to be the case in hydropical persons.

TRANSPLANTING, in agriculture and gardening, the act of removing trees or plants from the places where they were sowed, or raised, and planting them in others. See PLANTING.

TRANSPORTATION, the act of conveying or carrying a thing from one place to another.

Transportation is a kind of punishment, or more properly an alleviation or commutation of punishment, for criminals convicted of felony, who, for the first offence (unless it be an extraordinary one) were generally transported to the plantations, but now to the ballast-lighter, there to bear hard labour for a term of years.

TRANSPORTATION *of Plants*, is the sending of plants from one country to another; in performing which, great cautions are necessary.

TRANSPOSITION, in algebra, the bringing any term of an equation over to the other side.

TRANSPOSITION, in grammar, a disturbing or dislocating of the words in a discourse, or a changing of their natural order of construction, to please the ear by rendering the contexture more easy, smooth, and harmonious.

TRANSPOSITION, in musick, is a changing of the notes of a piece of musick, or the shifting a song from its former situation, to set it either higher or lower, or in another octave.

TRANSUBSTANTIATION, *Transubstantiatio*, in theology, is the conversion or change of the substance of the bread and wine in the eucharist, into the body and blood of Jesus Christ, which the Romish church maintains is wrought by the consecration of the priest.

This is one of those principle articles, on which the Protestants differ from the Papists. The Protestants believe, that Christ is received spiritually and by faith in the sacrament; while the Papists assert that the elements of bread and wine are actually and substantially changed into the very body and blood of Christ, immediately upon saying the words of consecration, so as to leave neither bread nor wine remaining. The one contend, that the Words, *Hoc est corpus meum*, "This is my body," imply, that This *signifies* my body, and that the eucharist (according to the words of the apostle) only *shews forth the Lord's death till he come*: but the other insist, that the phrase is to be taken *literally*, and that Christ, consequently, eat his own body. The verb *est*, in this case, must mean *significat*, as in other places, and particularly in that (noticed by *Zuinglius* in his book *De Eucharistia*) of *Exodus* xii. 11. where the paschal lamb is expressly called *the* LORD's *Passover*, or Transit from *Egypt*. This passage is also noticed by *Witsius* in his *Miscellanea Sacra*, lib. i. c. xxiv.——The books, which have been written upon this controversy, are numberless.

TRANSUMPTION, *Transumptio*, in the schools, a syllogism by concession or agreement, used where a question proposed is transferred to another, with this condition, that the proof of this latter should be admitted for the proof of the former.

TRANSVERSALIS, in anatomy, a name given to several muscles, &c. in respect of their situation, progress, &c. as, 1. The transversalis abdominis, a muscle which lies under the obliqui, and arises from the cartilago xiphoides, from the extremities of the false ribs, from the transverse apophysis of the vertebræ of the loins, is fixed to the inner side of the spine of the ileum, and inserted in the os pubis and linea alba. This, with the obliqui, unites its tendons as it approaches the linea alba, and is the only muscle that is cut in the operation of the bubonocele. It has a fine, and thin membrane, that closes exactly its ring, or hole through which the vessels pass. 2. Transversalis colli, it is said to be a part of the longissimus dorsi. It arises from the os sacrum, and from all the transverse processes of the vertebræ of the loins, back, and neck, except the two first; and is inserted by so many distinct tendons into all the superior spines. It moves the whole spine obliquely backwards. 3. Transversalis pedis placentini, comes from the bone of the metatarsus that sustains the toe next the little toe, and passing across the other bones, is inserted into the os sesamoides of the toe. Its use is to bring all the toes close to one another. 4. Transversalis penis, one of the dilators of the urethra, arising from the tubercle of the os ischium on each side, and inserted into the posterior part of the bulb of the urethra; however, these muscles are not quite determinate and certain in their origin or insertion, and sometimes they are wholly wanting: when they act, they dilate the urethra in its posterior part. 5. Transversalis is also a name given to a suture of the cranium, because of its traversing or crossing the face from one side to another.

TRANSVERSE, something that goes across another, from corner to corner: thus, bends and bars, in heraldry, are

are tranſverſe pieces or bearings: the diagonals of a parallelogram, or a ſquare, are tranſverſe lines: lines which make interſections with perpendiculars, are alſo called oblique or tranſverſe lines.

TRANSVERSE-MUSCLES, in anatomy, are certain muſcles ariſing from the tranſverſe proceſſes of the vertebræ of the loins.

TRAPESIUM, in geometry, is a plane figure contained under four unequal right lines.

TRAPEZOID, is a ſolid irregular figure, having four ſides not parallel to one another.

TRAVERSE, or TRANSVERSE, in general, denotes ſomething that goes athwart another; that is, croſſes and cuts it obliquely.

Hence, to traverſe a piece of ordnance, among gunners, ſignifies to turn or point it which way one pleaſes, upon the platform.

In fortification, traverſe denotes a trench with a little parapet, or bank of earth, thrown perpendicularly acroſs the moat, or other work, to prevent the enemy's cannon from raking it. Theſe traverſes may be from 12 to 18 feet, in order to be cannon proof, and their height about ſix or ſeven feet, or more, if the place be expoſed to any eminence. And to preſerve a communication, a paſſage of five or ſix feet wide muſt be left at one end of the traverſe.

If any part of a work, thus ſhut in by one or more traverſes, is likely to be defended by the muſketry, it will be proper to add to the traverſes one or more footbanks within the defence, for the troops to mount on, when they want to fire over the traverſe.

TRAVERSE, in navigation, is a compound courſe, wherein ſeveral different ſucceſſive courſes and diſtances are known.

To work a traverſe, or to reduce a compound courſe to a ſingle one, 1. Make a table of ſix columns, marked courſe, diſtance, N. S. E. W. beginning at the left-hand, and write the given courſes and diſtances in their proper columns. 2. Seek the given courſes and diſtances in the traverſe table, and let the correſponding differences of latitude and departure be wrote in their proper columns in the table made for the queſtion. 3. Add up the columns of northing, ſouthing, eaſting, and weſting; then the difference between the ſums of northing and ſouthing, gives the whole difference of latitude, which is of the ſame name with the greater; and the difference between the ſums of eaſting and weſting will be the whole departure, which is likewiſe of the ſame name with the greater. 4. The whole diff. lat. and depart. to the compound courſe being found, the direct courſe and diſtance will be found.

TRAVERSE, in law, denotes the denial of ſome matter of fact alledged to be done in a declaration, or pleadings; upon which the other ſide coming and maintaining that it was done, iſſue is joined for the cauſe to proceed to trial.

TRAVERSE *of an Indictment*, or *Preſentment*, is the contradicting or denying ſome chief point of it, and taking iſſue thereon.

TRAVERSE *of an Office*, is the proving that an inquiſition made by lands or goods, is defective and untruly made.

TRAVESTY, or TRAVESTI, a French term, derived from the verb traveſtir, to diſguiſe one's ſelf, or to appear in maſquerade; and hence, traveſty is applied to the diſfiguring of an author, or the tranſlating him into a ſtyle and manner different from his own, by which means it becomes difficult to know him.

TRAUMATICKS, the ſame with vulnerary medicines. See VULNERARY.

TREACLE, *Theriaca*, in pharmacy. Some alſo give the name treacle to moloſſes: and in this ſenſe it is that Dr. Shaw, in his Eſſay on Diſtillery, has endeavoured to bring into uſe ſeveral ſorts of treacles, which might be made at home, and would ſerve very conveniently for the diſtillation of ſpirits, or the making of potable liquors. Theſe are inſpiſſated juices or decoctions of vegetables: ſuch as the ſweet juice of the birch, or ſycamore, procured by tapping or piercing the trees in ſpring, and the common wort made from malt, or from other vegetable ſubſtances treated in the ſame manner. Theſe liquors are ſeverally to be boiled down in a copper till they begin to inſpiſſate, and then to be poured into a balneum mariæ, when the remainder of the evaporation may be finiſhed without burning the inſpiſſated juices thus prepared, it may be at any time reduced to the ſtate of wort, only by adding a ſufficient quantity of warm water.

TREASON, in general, ſignifies betraying; but is more particularly uſed for the act or crime of infidelity to one's lawful ſovereign.

Treaſon is divided, by lawyers, into high-treaſon, and petty-treaſon. The firſt of theſe is an offence committed againſt the ſecurity of the king or kingdom: as to compaſs, or imagine, the death of the king, queen, or their eldeſt ſon and heir; or in caſe a perſon does violate or deflower the king's wife, or his eldeſt daughter unmarried, or the wife of the king's eldeſt ſon; or if he levy war againſt the king within his kingdom, or adhere to his enemies, give them aid or comfort within the realm, or elſewhere; or if he counterfeit the king's great or privy ſeal, or his money, or bring falſe money into the kingdom, like to what we have here, and utter the ſame: if he kill the chancellor, treaſurer, juſtices of either bench, juſtices of aſſize, or of oyer and terminer, ſitting in judgment and repreſenting the king's perſon, in the execution of his office: all theſe caſes are deemed treaſon by 25 Ed. III. c. 2. which ſtatute is made the only ſtandard of high-treaſon; and 1 Mary c. 1. takes away the power of the king and parliament to adjudge any thing elſe to be high-treaſon but what is declared to be ſuch therein: it is true, temporary ſtatutes of late times enacted, have made ſome other offences treaſon, as relating to papiſts and the proteſtant ſucceſſion.

It has been held, that words only, where they are deliberate, and ſhew a direct purpoſe againſt the king's life, will amount to an over-act of compaſſing or imagining his death, and are high-treaſon: for words are the moſt natural way of expreſſing the imagination of the heart, and may be good evidence of it: not only words of perſuaſion to kill the king, but ſuch as are ſpoken in order to draw away the affections of his people, and to ſtir them up againſt him, are tending to the king's death, and therefore treaſon. Likewiſe where a perſon intends by force to preſcribe laws to the king, or to reſtrain himof his royal power, it has been adjudged an intention to deprive him of his crown and life: and in the eye of the law, every rebellion is a treaſonable plot againſt the life of the king, for a rebel would not ſuffer that king to live and reign, who would puniſh his offence.

As to make a crime treaſon, there muſt be always ſome overt-act; a bare conſpiracy, or compaſſing to levy war, is no ſuch act, unleſs it be really levied; in which caſe the conſpirators are all traitors, although they are not in arms: perſons that raiſe forces for any publick end or purpoſe, or who make an inſurrection on any account, are ſaid to levy war againſt the king, though perhaps without a direct deſign againſt his perſon; and it extends to the caſe where great numbers forcibly endeavour to remove certain perſons from the king, &c. The adhering to the king's enemies, is taken to be an adherence againſt him, and even out of the realm it is treaſon: and it is ſaid, that cruiſing in a ſhip of war with an intent to deſtroy the king's ſhips, though no act of hoſtility be committed, is an overt-act of adhering, comforting, and aiding.

All trials for high-treaſon are to be according to the courſe of the common law; and perſons indicted for this crime, are to have a copy of the indictment five days before their trial, that they may have ſufficient time to adviſe with council; they ſhall likewiſe be permitted to make a full defence by their council learned in the law, and by lawful witneſſes, &c. And in this caſe there muſt be two evidences to the ſame overt-act, or to two acts of the ſame treaſon, produced face to face againſt them.

It is alſo ſaid, where a perſon is convicted of treaſon, the omiſſion of any neceſſary part of the judgment will be held to be error, on which he may reverſe the attainder; as the judgment is ſeverer, and more formidable, in caſe of high treaſon than for any other crime whatever; ſince the offender is to be hanged, drawn and quartered, and alſo forfeit his lands and goods to the king.

Petty-TREASON, is where a ſervant kills his maſter, a wife her huſband, or a ſecular or religious perſon kills his prelate or ſuperior, to whom he owes faith and obedience; and aiders and abetters, as well as procurers, are within the act. However, ſo ſtrictly is the ſtatute conſtrued, that no caſe not expreſſly mentioned therein is puniſhable by it: hence if a ſon kill his father, he ſhall not

not be tried for petty-treason, except he served his father for wages, in which case he is to be indicted under the name of a servant.

Petty-treason implies the highest degree of murder, and occasions the forfeiture of lands by escheat to the lord of the fee; and the further punishment of the criminal is to be hanged, drawn, and quartered for it, and a woman to be burnt.

TREASURE, in general, denotes a store or stock of money in reserve.

TREASURE-TROVE, in law, is where any treasure is found buried in the earth, but not lying on the ground, and no man knows to whom it belongs: this, in England, belongs to the king; and to conceal it is punishable by fine and imprisonment.

TREASURER, an officer to whom the treasure of a prince, or corporation, is committed to be kept and duly disposed of.

The lord high treasurer of Great-Britain, or commissioners of the treasury, when the office is in commission, has under charge and government all the king's revenue, which is kept in the Exchequer. He holds his place during the king's pleasure, being instituted by the delivery of a white staff to him: he has the check of all the officers employed in collecting the customs and other royal revenues; and in his gift and disposition, are all the offices of the customs in the several ports of the kingdom; escheators in every county are nominated by him; he also makes leases of the lands belonging to the crown.

There is, besides the lord-treasurer, a treasurer of the king's houshold, who is of the privy-council, and, with the comptroller and steward of the Marshalsea, has great power.

To these may be added the treasury of the Navy; as also the treasurer of the king's chamber, and of the wardrobe; and most corporations throughout the kingdom have treasurers, whose office is to receive their rents, and disburse their common expences.

TREASURY, the place wherein the revenues of a prince are received, preserved, and disbursed.

In England, the treasury is part of the Exchequer, by some called the Lower Exchequer. See EXCHEQUER.

TREATISE, *Tractatus*, a set discourse in writing on any subject. A treatise is supposed more express, formal, and methodical than an essay, but less so than a system. See ESSAY and SYSTEM.

TREATY, a covenant between two or more nations; or the several articles and conditions stipulated and agreed upon between sovereign powers.

Treaties are of various kinds; as treaties of peace, of alliance, of commerce, &c. for the guaranty of which, see GUARANTY.

TREBLE, in musick, the highest or acutest of the four parts in symphony, or that which is heard the clearest and shrillest in a concert. See CLEFF.

TREE, *Arbor*, the first and largest of the vegetable creation, consisting of a single trunk, or stem, from which issueth forth branches, leaves, flowers, and fruit.

There are various kinds of trees; some deciduous, as the elm, lime, &c. others evergreen, as the fir, pine, holly, yew, &c. They are also distinguished, in the nurseries, into dwarfs and standards, particularly fruit-trees.

Standard-trees are such as naturally rise to a great height, and are not topped. For the choice of trees of this kind to be transplanted out of a nursery, Quintiney recommends us to such as are straight, six feet high at least, and five or six inches thick at bottom, and three or four at top; the bark pretty smooth and shining, as a token of their youth, and of the good soil they grew in.

Dwarf-trees are such as are kept low, and never suffered to have above half a foot or stem.

Heat is so essential to the growth of trees, that we see them grow larger and smaller in a sort of gradation, as the climates in which they stand are more or less hot. The hottest countries yield in general the largest and tallest trees, and those also in much greater beauty and variety than the colder do; and even those plants which are common to both arrive at a much greater bulk in the southern, than in the northern climates; nay, there are some regions so bleak and chill, that they raise no vegetables at all to any considerable height. Greenland, Iceland, and the like places, afford no trees at all; and what shrubs grow in them are always little and low. In the warmer climates, where trees grow to a moderate size, any accidental diminution of the common heat is found very greatly to impede vegetation; and even in England, the cold summers we sometimes have, give us an evident proof of this; for though the corn and low plants have succeeded well enough, and gooseberries, currants, rasberries and other low shrubs, have brought forth fruit in sufficient plenty, yet the production of taller trees has been found very much hurt; and walnuts, apples, and pears, have been very scarce among us.

Heat is heat, be it from what cause it will, and acts as well upon vegetation one way as another. Thus the heat of dung, and the artificial heat of coal fires in stoves, are found to supply the place of the sun.

Plantations of useful trees might be made to very great advantage in many places in every country, and the country greatly enriched by it, while the publick would be also benefited by it, since it would raise a continual supply of timber used in ship-building, and on other publick as well as private occasions.

We have, in many places, heaths, and other barren and uncultivated lands, of very great extent; and how great an advantage would it be to the publick, to bring these to be truly valuable! Many, if not all of these heaths, would be found, on trial, capable of producing trees; and some of them are truly the remains of destroyed forests; and, though the profits to be reaped from the planting these would come late, yet the expence of doing it would be very trifling in comparison of that profit, and the means easy.

TREFOIL, *Trefolium*, in botany, a genus of the diadelphia decandria class; of which genus the clover is a species. See CLOVER.

TREMELLA, in botany, a genus of cryptogamious plants, of the flag kind; they consist of an uniform substance, which is foliacious, pellucid, and membranaceous, and in some respects like the lichen. See LICHEN.

TREMBLING *of the Joints*, or TREMOUR, is an involuntary shaking, chiefly of the hands and head, sometimes of the feet, and sometimes of the tongue and heart. It is a disorder which frequently attacks persons advanced in years, and sometimes the younger sort. It seems to arise from a defect of spirits, sometimes from terror, or other violent passion, and sometimes from a plethora. Too much drinking of coffee also produces a tremour in some persons, as too plentiful drinking and surfeits will in others. Tremours are often dangerous, as being apt to degenerate into other nervous distempers; as spasms, the palsy, lethargy, apoplexy, &c.

In the cure, those things should be avoided that promote the disease, and the patient should drink balm or sage tea, or a diet-drink made of China-root; Peruvian-bark may also be taken, in an infusion of balm or sage, or succinated spirit of harts-horn, twice or thrice in a day; and in the evening an antispasmodick powder may be taken, especially if the patient is hot, or uses much wine. Outwardly, the neck and spine of the back may be rubbed with the spirits of ants, earth-worms, and sal ammoniack, mixed together; a fourth part of the volatile spirits will be sufficient, or opodeldock may be used in their stead. If the patient is plethorick, bleeding is useful; and in old persons, a draught of generous wine at meals: pediluvia, hot-baths, and mineral waters, may be also used, but with caution.

As to the medicine commonly used in tremours and other nervous distempers, under the name of palsy-drops, it is no other than compound spirit of lavender; the most successful way of using which is by taking 30 or 40 drops, twice or thrice a day, dropped on loaf-sugar, or a little bread. It is supposed, that by this way, the most spirituous and efficacious parts make their way directly by the nerves of the palate, &c. without undergoing the course of the circulation, as it is said to do when taken in a liquid vehicle.

TRENCHES, in fortification, are ditches cut by the besiegers, that they may approach more securely to the place attacked; whence they are also called lines of approach. The tail of the trench is the place where it was begun, and its head is the place where it ends.

The trenches are usually opened, or begun, in the night time; sometimes within musket-shot, and sometimes within half or whole cannon-shot of the place. They are carried on in winding lines, nearly parallel to the

works

works of the fortress, so as not to be in the view of the enemy, nor exposed to the enemy's shot.

The workmen employed in the trenches are always supported by a number of troops, to defend them against the sallies of the besieged: the pioneers sometimes work on their knees, and are usually covered with mantlets or faucissons; and the men who support them lie flat on their faces, in order to avoid the enemy's shot.

TRENTAL, or TRIGINTAL, a Romish office for the dead, consisting of 30 masses rehearsed for 30 days successively after the party's death. See MASS.

TREPAN, *Terebra*, *Modiolus*, &c. in surgery, an instrument used in trepanning. See the next article.

TREPANNING, in surgery, a perforation or opening, made in the bones of the cranium, or skull.

This operation was performed by the antients, not only in fractures and depressions of the cranium, but also in those other obstinate disorders of the head and brain, which could not be relieved by internal medicines, and the use of issues upon the coronal suture; but the modern surgeons never use the trepan for internal disorders of the head, though they seldom neglect it in fractures and depressions of the cranium.

The trepan is therefore useful, not only in these cases, to elevate the depressed parts of a fractured bone in the cranium, but also to discharge the extravasated blood through an aperture made by this instrument.

The less time there is lost, the better, before the application of the trepan, but the operation itself must be conducted slowly and carefully; for it is extremely difficult, if not impossible, to take out a piece of the cranium by this instrument, without injuring the subjacent dura mater, to which it is most intimately attached.

For this reason, Heister is induced to condemn the advice of those who direct to trepan the cranium immediately upon every slight disorder of it: he therefore advises, first, to try the use of other remedies, both external and internal, rather than immediately subject the patient to the trepan, before it is absolutely necessary.

In general, the place where the fissure appears will be the most convenient to apply the trepan, if nothing indicates the contrary; but in fractures, it will be proper to trepan a little below the injured part, that the extravasated blood may be more easily discharged.

After having pitched upon the part to be trepanned, the next business is to shave the scalp, and make an incision through the integuments to lay bare the cranium, except it be done already by the wound. The incisions of the integuments may be made in the form of a cross, large enough to admit the crown of the trepan upon the bone.

TREPIDATION, in medicine, the same with tremour, or trembling. See TREMBLING.

TREPIDATION, in the ancient astronomy, denotes what they call a libration of the eighth sphere, or a motion which the Ptolematick system attributed to the firmament, to account for certain and almost insensible changes and motions observed in the axis of the world, by means whereof the latitudes of the fixed stars come to be gradually changed, and the ecliptick seems to approach reciprocally first towards one pole, then towards the other. This motion is called the motion of the first libration.

TRESPASS, in law, signifies any transgression of the law, under treason, felony, or misprision of either; but it is most commonly used for any wrong or damage that is done by one private person to another, or to the king in his forest, &c.

The defendant in trespass can, by his plea, put the plaintiff to a new assignment of the place where, &c.

TRESSURE, in heraldry, a diminutive of an orle, usually held to be half the breadth thereof.

TRET, in commerce, an allowance made for the waste, or the dirt, that may be mixed with any commodity, which is always 4 lb. in every one 104 lb. weight.

TRIAL, in law, the examination of a cause, civil or criminal, according to the laws of the land, before a proper judge: or, it is the matter and order observed in the hearing and determining of causes.

There are divers kinds of trials; as those of matters of fact, which must be tried by a jury; matters of law, which are only triable by the courts; and matters of record, which are to be tried by the records themselves.

TRIANDRIA, in botany, the name of the third class in the Linnæan system, consisting of those plants which bear hermaphrodite flowers, each containing three stamina, or male parts. To this class belong the reed, barley, wheat, &c. with most of the grass tribe.

TRIANGLE, in geometry, is a figure of three sides and three angles, and either plane or spherical.

Plane TRIANGLE, is that contained under three right lines; as A, B, C, (*plate* LXXVI. *fig.* 3.)

Spherical TRIANGLE, is that contained under three arches of a great circle of the sphere; as A, B, C, (*fig.* 13.)

Of triangles there are several sorts, as, 1. A right-angled triangle, is that which hath one right angle. 2. An obtuse-angled triangle, is such as hath one obtuse angle. 3. An acute-angled triangle, is that which hath all its angles acute. 4. Any triangle that is not right-angled, is called oblique-angled, or amblygonial. 5. An equilateral triangle, is that which hath all its sides equal to one another. 6. An Isosceles, or an equilateral triangle, is that which hath only two sides equal. 7. A scalenous triangle, is that which has no two sides equal. In every triangle, the sum of all the three angles is equal to two right ones; and the external angle, made by any side produced, is equal to the sum of the internal and its opposite one.

In every right-angled triangle, the square of the hypothenuse is equal to the sum of the squares of the other two sides. This was discovered by *Pythagoras*.

Every triangle is one half of a parallelogram of the same base and height.

The area of any triangle may be had by adding all the three sides together, and taking half the sum, and from that half sum subtracting each side severally, and multiplying that half sum and the remainder continually into one another, and extracting the square root of the product.

TRIANGULAR COMPASSES, are such as have three legs or feet, whereby to take off any triangle at once, much used in the construction of maps, globes, &c.

TRIANGULAR *Numbers*, are a kind of polygonal numbers, being the sums of arithmetical progressions, the difference of whose terms is 1.

Thus — of arithmetical progress 1 2 3 4 5 6,
are formed triangular numbers 1 3 6 10 15 21.

TRIANGULAR *Canon*, the tables of artificial sines, tangents, secants, &c.

TRIANGULAR *Quadrant*, is a sector furnished with a loose piece, whereby to make it an equilateral triangle. The calendar is graduated thereon, with the sun's place, declination, and other useful lines; and by the help of a string and a plummet, and the divisions graduated on the loose piece, it may be made to serve for a quadrant.

TRIANGULARIS, in anatomy, a name given to two muscles in respect of their figure.

The triangularis pectoris, which has sometimes the appearance of three or four distinct muscles, arises from the inside of the sternum, and is implanted into the cartilages, which join the four lowest true ribs to the sternum.

The action of this muscle is very obscure, since both the organization and insertion are at parts not moveable, but together. Dr. Drake conjectures it may conduce towards forming the necessary incurvation of the sternum, and by its over tension in children, while the cartilages are soft, may occasion that morbid accumination in the sternum seen in rickety children. Others suppose it may contract the cavity of the thorax in exspiration.

TRIARII, in the Roman militia, a kind of infantry armed with a pike, a shield, a helmet, and a cuirass; thus called, because they made the third line of battle.

TRIAS *Harmonica*, or *the Harmonical* TRIAD, in musick, a compound of three radical sounds, heard all together, two whereof are a 5th and 3d above the other, which is a fundamental.

TRIBE, *Tribus*, in antiquity, a certain quantity or number of persons, when a division is made of a city or people into quarters or districts.

TRIBULUS, caltrop, in botany, a genus of plants, the corolla of which consists of five oblong, obtuse, and patent petals: its fruit is of a roundish figure and aculeated, being composed of five capsules, gibbous on one side, and armed with three or four points on the other, angulated and convergent; and containing numerous seeds, turbinated and oblong.

There are three pieces of this plant enumerated by Mr. Miller, the first of which is very common in the south of France, in Spain, and Italy, where it grows

among

among corn, and on moſt of the arable land, and is very troubleſome to the feet of cattle; for the fruit being armed with ſtrong prickles, run into the feet of cattle, which walk over the land. This is certainly the plant which is mentioned in Virgil's Georgicks, under the name of tribulus, though moſt of his commentators have applied it to other plants.

It is called in Engliſh caltrop, from the form of the fruit, which reſembles thoſe inſtruments of war that were caſt in the enemies way to annoy their horſes.

TRIBUNAL, judgment-ſeat, or the ſeat of a judge, called in our courts, *bench*.

TRIBUNAL, among the ancients, was alſo a place from whence the people were harangued.

TRIBUNE, *Tribunus Plebis*, in antiquity, a Roman magiſtrate choſen out of the commons, to protect them againſt the oppreſſions of the great, and to defend the liberty of the people againſt the attempts of the ſenate and conſuls.

The tribunes of the people were firſt eſtabliſhed in the year of Rome, 259. The firſt deſign of the creation was to ſhelter the people from the cruelty of uſurers, and to engage them to quit the Aventine mount, whither they had retired in diſpleaſure.

Their number, at firſt, was but two; but the next year, under the conſulate of A. Poſthumus Aruncius and Caſſius Viſcellinus, there were three more added; and this number of five was afterwards increaſed by L. Trebonius, to ten. The appellation, tribune, was given them, by reaſon they were at firſt choſen out of the tribunes of the army.

TRIBUNE, *Tribunus Militum*, or *Militaris*, an officer in the Roman army, who commanded in chief over a body of forces, particularly the diviſion of a legion, much the ſame with our colonel, or the French meſtre de camp.

TRIBUTARY, *Tributarius*, one who pays tribute to another, in order to live in peace with him, or ſhare in his protection.

TRIBUTE, *Tributum*, a tax or impoſt which one prince or ſtate is obliged to pay to another as a token of dependence, or in virtue of a treaty, and as a purchaſe of peace.

TRICEPS, in anatomy, a muſcle of the thigh, having three originations, and as many inſertions; and which may, therefore, be conveniently divided into three muſcles, all ariſing from the os pubis, and inſerted into the linea aſpera of the thigh-bone, whereof they poſſeſs the greateſt part. They alſo ſerve for adductores, and draw the thigh together.

TRICUSPIDES VALVÆ, in anatomy, three valves placed at the mouth of the right ventricle of the heart, juſt at its juncture with the auricle. See COR.

TRIDENT, *Tridens*, an attribute of Neptune, being a kind of ſceptre which the painters and poets put into the hands of that god, in form of a ſpear, or fork, with three teeth; whence the word.

TRIDENT, among mathematicians, is uſed for a kind of parabola, by which Des Cartes conſtructed equations of ſix diviſions.

TRIEMIMERIS, a kind of cæſura in Latin verſe, wherein after the firſt foot of the verſe there remains an odd ſyllable, which helps to make up the next foot.

TRIENNIAL, an epithet applied chiefly to offices or employments which laſt for three years.

TRIENS, in antiquity, a copper money of the value of one-third of an as, which on one ſide bore a Janus's head, and on the other a water-rat.

This was the piece of money uſed to be put in the mouths of the deceaſed to pay Charon his fare for their paſſage into another life

TRIGA, in antiquity, a kind of carr, or chariot, with three horſes.

TRIGAMY, a third marriage, or the ſtate of a perſon who has been married three times.

TRIGLYPHS, in architecture, a ſort of ornaments repeated at equal intervals in the Dorick freeze.

Each triglyph conſiſts of two entire gutters, or channels, cut to a right angle, called glyphes, and ſeparated by three interſtices, called, by Vitruvius, femora, from each other, as well as from two other half channels which are at the ſides.

The ordinary proportion of triglyphs is to be a module broad, and one and a half high. But this proportion, M. le Clerc obſerves, ſometimes occaſions ill-proportioned intercolumnations in porticoes; for which reaſon he chuſes to accommodate the proportion of his triglyphs to that of the intercolumns.

TRIGON, *Trigonus*, a triangle. See TRIANGLE.

TRIGON, in aſtronomy, denotes an aſpect of two planets, wherein there are 120 degrees diſtant from each other; called alſo trine.

TRIGONOMETRY, the art whereby, from any three parts of a triangle, except the three angles, the reſt are diſcovered.

Trigonometry is either plane or ſpherical.

Plane TRIGONOMETRY, is the method of ſolving plane triangles.

Solution of the ſeveral Caſes of plane TRIGONOMETRY.

Caſe I. The angles of one of the legs of a right-angled plane triangle being given, to find the other leg.

Example. In the triangle A B C (*plate* LXXVI. *fig.* 3.) right-angled at B,

Are given A B = 52 equal parts, as yards, furlongs, miles, &c.

And the angle C A B = 36d. 52m. required B C.

The geometrical ſolution. 1. Make A B equal to 52, by a line of equal parts.

2. Extend your compaſſes to the diſtance of the radius of your line of chords, and with this diſtance, ſetting one foot in A, deſcribe the arch *e f*, and from *f* towards *e* ſet off 36d. 52m. the angle at A, on the arch *f e*.

3. Erect the perpendicular B C.

4. From A, through the interſection *e*, draw the line A C, meeting the perpendicular B C in C; then is the triangle conſtructed, and the perpendicular B C may be meaſured, by applying it to the ſame line of equal parts from whence A B was taken.

The arithmetical ſolut. 1. By ſuppoſing AC the radius.

Produce A C to *c*, till A *c* be equal to the tabular radius 10000000, &c. then will *b c* be the tabular ſine of the arch *c d*, and A *b* will be the tabular co-ſine of the ſame arch: alſo, B C will be the ſine of the arch B D, and A B the co-ſine of the ſame arch.

And becauſe the triangles A B C, A *b c*, are ſimilar, it will be,

As A *b* : A B : : *b c* : B C. That is,

A *b* (the tabular co-ſine of the arch *c b*) = 36d. 52m. = - -	9.9031084
To A B (the co-ſine of the arch C D in the ſcheme) = 52 = - -	1.7160033
So is *b c* the tabular ſine of the arch *c d*) = 36d. 52m. = - -	9.7781186
To C B (the ſine of the arch C D in the ſcheme) required = 39 =	1.5910135

2. By ſuppoſing A B (*fig.* 9.) the radius.

Produce A B to *b*, till A *b* be equal to the tabular radius, then will *b c* be the tabular tangent of the arch *b d*, and B C the tangent of the arch B D.

And becauſe the triangles A B C, A *b c*, are ſimilar, it will be,

As A *b* : A B : : *b c* : B C. That is,

As A *b* (the radius in the tables) = 90d. =	10.0000000
To A B (the radius of the ſcheme) = 52 =	1.7160033
So is *b c* (the tangent of the arch *b d* in the tables) = 36d. 52m. = -	9.8750102
To B C (the tangent of the arch B D in the ſcheme) = 39 = - -	1.5910135

3. By ſuppoſing B C (*fig.* 7.) the radius.

Produce C B to *b*, till C *b* be equal to the tabular radius, then will *a b* be the tabular tangent of the arch *b d*, or angle *a* C *b*, the complement of the given angle; alſo, A B will be the tangent of the arch B D.

And becauſe the triangles C *a b*, C A B, are ſimilar it will be,

As *a b* : A B : : C *b* : C B. That is,

As *a b* (the tabular tangent of the arch *b d* 53d. 8m.) - - -	10.1249898
To A B (the tangent of the arch B D in the ſcheme) 52, - - -	1.7160033
So is C *b* (the tabular radius) = 90d. =	10.0000000
To C B (the radius of the ſcheme) = 39 =	1.5910135

Caſe II. The angles and one of the ſides of a right-angled plane triangle being given, to find the hypothenuſe.

Example. In the triangle A B C (*fig.* 3.) right-angled at

at B, are given the angle C A B, = 36d. 52m. and the ſide A B = 52 equal parts; required the hypothenuſe, A C.

Geometrically. This caſe is conſtructed, in all reſpects, like the former, and A C may be meaſured by the ſame line of equal parts which A B was taken from.

Arithmetically. 1. By ſuppoſing A C the radius.

Produce A C to *c*, till A *c* be equal to the tabular radius, then will *b c* be the ſine of the arch *c d*, and C B the ſine of the arch C D; alſo, A *b* will become the co-ſine of the arch *c d*; or, which is all one, the ſine of its complement, and A B the co-ſine of the arch C D, or ſine of its complement.

And becauſe the triangles A B C, A *b c*, are ſimilar, it will be,

As A *b* : A B :: A *c* : A C. That is,

As A *b* (the tabular co-ſine of the arch *c d*) 36d. 52m. - - 9.9031084
Is to A B, (the co-ſine of the arch C D in the ſcheme) = 52 = - - 1.7160033
So is A *c* (the tabular radius) = 90d. = 10.0000000

To A C (the radius in the ſcheme) = 65 = 1.8128949

2. By ſuppoſing A B the radius.

Produce A B (*fig.* 9.) to *b*, till A *b* be equal to the tabular radius, then will *b c* be the tangent of the arch *d b*, and A *c* the ſecant of the ſame arch; alſo B C will be the tangent of the arch B D, and A C the ſecant of the ſame.

And becauſe the triangles A B C, A *b c*, are ſimilar, it will be,

As A *b* : A B :: A *c* : A C. That is,

As A *b* (the radius in the tables) = 90d. = 10.0000000
Is to A B (the radius in the ſcheme) = 52 = 1.7160033
So is A *c* (the ſecant of the arch *b d* in the tables) = 36d. 52m. = — 10.0968916

To A C (the ſecant of the arch B D in the ſcheme) 65, — — 1.8128949

3. By ſuppoſing B C (*fig.* 7.) the radius.

Produce C B to *b*, till C *b* be equal to the tabular radius, then will *a b* be the tabular tangent of the arch *b d* (or angle *a* C *b*) and C *a* will be the ſecant of the ſame arch; alſo, A B will be the tangent of the arch B D, and C A the ſecant of the ſame arch.

And becauſe the triangles *a b* C, A B C, are ſimilar, it will be,

As *a b* : A B :: C *a* : C A. That is,

As *a b* (the tabular tangent of the arch *b d*) 53d. 8m. — — 10.1249898
Is to A B (the tangent of the arch D B in the ſcheme) 52, — — 1.7160033
So is C *a* (the tabular ſecant of the arch *b d*) 53d. 8m. — — 10.2218814

To C A (the ſecant of the arch B D in the ſcheme) 65, — — 1.8128949

By carefully conſidering the three different methods of performing the two preceding caſes, the reader may make theſe three general obſervations:

1. If the hypothenuſe be ſuppoſed the radius, the two legs will become the ſines of their oppoſite angles.

2. If the baſe be ſuppoſed the radius, the perpendicular will become the tangent of the angle at the baſe, and the hypothenuſe the ſecant of the ſame angle.

3. If the perpendicular be ſuppoſed the radius, the baſe will become the tangent of the angle at the perpendicular, and the hypothenuſe the ſecant of the ſame angle.

Caſe III. The hypothenuſe and angles of a right-angled plane triangle being given, to find either of the legs.

Example. In the triangle A B C (*fig.* 3.) right-angled at B, are given the angle C A B = 36d. 52m. and the hypothenuſe A C = 65, required A B.

Geometrically. 1. Draw the line A B at pleaſure.

2. Make the angle at A equal to 36d. 52m. by the line of chords (as taught in the firſt caſe) and continue the line A C, till it be equal to 65, upon the line of equal parts.

3. Let fall the perpendicular C B, and the triangle is conſtructed; and the baſe A B may be meaſured by applying it to the ſame line of equal parts which A C was taken from.

Arithmetically. By ſuppoſing A C the radius.

Produce A C to *c*, till it equal the tabular radius, then will A *b* = the tabular co-ſine of the angle at A, or the ſine of the angle A *c b*, it being its complement.

And from the ſimilarity of the two triangles A *b c*, A B C, it will be,

As A *c* : A C :: A *b* : A B. That is,

As A *c* (the radius in the tables) = 90d. = 10.0000000
To A C (the radius in the ſcheme) = 65 = 1.8128949
So is A *b* (the co-ſine of the arch *c d* in the tables) = 36d. 52m. = — 9.9031084

To A B (the co-ſine of the arch C D in the ſcheme) = 52 = — 1.7160033

Caſe IV. The legs of a right-angled plane triangle being given, to find the angles.

Example. In the right-angled plane triangle A B C (*fig.* 3.) are given the baſe A B = 52, and the perpendicular B C = 39, required the angles A and C.

Geometrically. 1. Make A B equal to 52, from a line of equal parts.

2. From the point B erect the perpendicular B C, and ſet off on it 39 equal parts from B to C; and join the points A C with the right line A C, and the triangle is conſtructed; and the quantities of the angles A and C may be meaſured by the line of chords, after the manner taught in the firſt caſe.

Arithmetically. By ſuppoſing A B the radius. Make A *b* equal to the tabular radius, then will *b c* be the tangent of the angle A.

And becauſe of the ſimilarity of the two triangles A *b c*, A B C, it will be,

As A B : A *b* :: B C : *b c*. That is,

As A B (the radius in the ſcheme) = 52 = 1.7160033
To A *b* (the radius in the tables) = 90d. = 10.0000000
So is B C (the tangent of the arch B D in the ſcheme) = 39 = — 1.5910135

To *b c* (the tangent of the arch *b d* in the tables = 36d. 52m. = — 9.8750102

Which, ſubtracted from 90d. leaves the angle C = 53d. 8m.

Caſe V. The hypothenuſe and one of the legs of a right-angled plane triangle being given, to find the angles.

Example. In the triangle A B C (*fig.* 3.) right-angled at B, are given the baſe A B = 52, and the hypothenuſe A C = 65, required the angles A and C.

Geometrically. 1. Make A B equal to 52 by a line of equal parts.

2. Erect the perpendicular B C.

3. Take the diſtance of 65 equal parts between the points of the compaſſes, and ſetting one foot in A, with the other croſs the perpendicular B C in C, and join the points A and C with a right line, and the triangle is conſtructed; and the quantities of the angles may be meaſured by the line of chords, after the manner taught in the firſt caſe.

Arithmetically. By ſuppoſing the hypothenuſe A C the radius.

Make A *c* (*fig.* 3.) = the radius of the tables, then will A *b* repreſent the tabular co-ſine of the arch *c d*.

And becauſe the triangles A *b c*, A B C, are ſimilar, it will be,

As A C : A *c* :: A B : A *b*. That is,

As A C (the radius in the ſcheme) = 65 = 1.8128949
To A *c* (the radius in the tables) = 90 = 10.0000000
So is A B (the co-ſine of the arch C D in the ſcheme) = 52 = — 1.7160033

To A B (the co-ſine of the arch C *d* in the tables) = 53d. 8m. = — 9.9031084

Whoſe complement in 36d. 52m. the angle at A.

Caſe VI. The legs of a right-angled plane triangle being given, to find the hypothenuſe.

Example. In the right-angled triangle A B C (*fig.* 3.) there are given A B = 52, and B C = 39, required A C.

Geometrically. This caſe is conſtructed, in all reſpects, the ſame as the fourth, and the length of A C may be found by applying it to the ſame ſcale of equal parts, which the legs A B and B C were taken from.

The arithmetical ſolution of this caſe is the ſame as that of the ſecond and fourth caſes; for the angles being found as in caſe the fourth, the hypothenuſe may be found according to the ſecond caſe, which will be ſuperfluous here to repeat.

But

But the hypothenuse may be found by the help of the 47th of Euc. I. without finding the angles; thus,

To the square of one of the given sides A B	=2704
Add the square of the other side C D -	=1521
	4225

The square root of that sum will give A C required=65.

Case VII. The hypothenuse and one of the legs of a right-angled plane triangle being given, to find the other leg.

Example. In the right-angled plane triangle A B C (*fig.* 3.) there are given the hypothenuse A C=65, and the base A B=52; required the perpendicular B C.

Geometrically. The geometrical construction of this case is performed, in all respects, like the fifth, and the perpendicular B C may be found by applying it to the same scale of equal parts, which the other parts of the triangle were taken from.

This case being a compound of the fifth and first, we must first find the angles by the fifth, and the perpendicular by the first, to which we refer the reader.

But by the help of the 47th of Euc. I. the perpendicular may be found without the trouble of finding the angles; thus,

From the square of the hypothenuse A C -	= 4225
Take the square of the base A B -	=2704
	1521

The square root of the remainder will give B C required=39.

By carefully considering the solutions of the several preceding cases, the reader may observe.

1. That if the angles are given, any side, whether given or required, may be supposed the radius.

2. If the angles are required, one of the given sides must be supposed the radius.

The Solution of the several Cases of Oblique-angled Plane Triangles.

Case I. Two sides and an angle opposite to one of them being given, to find the other opposite angle.

Example. In the oblique-angled plane triangle A B C (*plate* LXXVI. *fig.* 6.) are given A B = 52, B C = 42, and the angle A C B = 42d. 16m. required the angle B A C.

Geometrically. 1. Draw the line A C at pleasure.

2. Make the angle A C B equal to 42d. 16m. by the line of chords, after the manner taught in case the first of the preceding solutions.

3. Make B C equal to 42, by a line of equal parts.

4. Take the distance of 52 equal parts between the points of the compasses, and setting one foot in B, with the other cross the line A C in A, and join the points A and B, with a right line, and the triangle is constructed; and the angle BAC may be measured by the line of chords.

Arithmetically. As A B -	=52=1.7160033
To the sine of its opposite angle A C B - -	42d. 16m. = 9.8291312
So is B C - - -	=42=1.6232493
To the sine of its opposite angle C A B, - -	33d. 1m.=9.7363772

Having found the angle A, the angle B may be found by taking the sum of the angles A and C from 180d.

Case II. The angles and one side of an oblique-angled plain triangle being given, to find either of the other sides.

Example. In the oblique-angled plane traingle A B C (*fig.* 6.) are given the angle A=33d. 1m. the angle B=104d. 43m. the angle C=42d. 16m. and the side A B = 52, required A C.

Geometrically. 1. Make the angle A = 33d. 1m. by the line of chords.

2. Make A B=52, by a line of equal parts.

3. Make the angle B = 104d. 43m. by the line of chords.

4. Draw the lines A C and B C till they intersect each other in C, and the triangle A B C is constructed; and A C may be measured by the same line of equal parts which A B was taken from.

Arithmetically. As the sine of the ang. C - - =42d. 16m. =	9.8291312
To its opposite side A B - =52=	1.7160033
So is the sine of the angle B=104d. 43m.=	9.9855135
To its opposite side A C - =74,5=	1.8723856

Case III. Two sides of an angle opposite to one of them being given, to find the other side.

Example. In the oblique-angled plane triangle A B C (*fig.* 6.) are given the side A B=52, the side B C=42, and the angle C=42d. 16m. required A C.

Geometrically. This case is constructed in all respects like the first, and the side A C may be measured by applying it to the line of equal parts.

But, to perform it arithmetically, it will be,

As the side A B - -	=52=1.7160033
Is to the sine of the angle C	=42d. 16m. =9.8291312
So is the side B C - -	=42=1.6232493
To the sine of the angle A -	=33d. 1m.=9.7363772

Hence the angle B=104d. 43m.

Then to find the side A C it will be, by the same theorem,

As the sine of the angle C -	=42d. 16m.=9.8291312
Is to the side A B - -	=52=1.7160033
So is the sine of the angle B	=104d. 43m.=9.9855135
To the side A C - -	=74,5=1.8723856

Case IV. Two sides and the contained angle of an oblique-angled plane triangle being given, to find the other angles.

Example. In the oblique-angled plane triangle A B C (*fig.* 6.) are given the side A C=74,5, the side A B=52, and angle A=33d. 1m. required the angles B and C.

Geometrically. 1. Make the line A C=74,5 by a line of equal parts.

2. From the angle A=33d. 1m. by the line of chords.

3. Let A B be made = 52 equal parts.

4. Join the points B and C with a right line, and the thing is done; and the angles B and C may be measured by the line of chords.

To perform this case arithmetically, we must first find the sum and difference of the two sides; also the half sum of the two unknown angles, which is performed by subtracting the given angle from 180d. and the remainder will be the sum of the angles B and C, the half of which will be the half sum required, which will be = 73d. 29m. 30sec.

Having found the sum and difference of the two sides, as, also, the half sum of the two unknown angles, the required angles will be found thus,

As the sum of the two sides A B and A C=126,5 - - =	2.1000905
To their difference - - =22,5=	1.3533825
So is the tang. of the half sum of the two unknown angles=73d. 29m. 30sec.=	10.5293633
To the tang. of half their diff. =31d. 13m. 30sec. - - =	9.7826553
To the half sum - =73d. 29m. 30 sec.	
Add the half difference=31d. 13m. 30sec.	
Their sum will be the greater angle B	104 43 00
From the half sum -	= 73d. 29m. $\frac{1}{2}$
Take the half difference	= 31d. 13m. $\frac{1}{2}$
Their diff.=the angle C - = - - - -	42d. 16m.

Case V. Two sides and the contained angle of any oblique-angled plane triangle being given, to find the third side.

Example. In the oblique-angled plane triangle ABC (*fig.* 6.) are given the side A C=74,5, the side A B=52, and the angle A=33d. 1m. required the side BC.

Geometrically. The geometrical construction of this case is exactly the same with the last, and the side B C may be measured by the line of equal parts.

This case is compounded of the fourth and first, and therefore the arithmetical method is the same as those two cases; for the angles B and C must be found by case the fourth, and the side B C will be found by case the first, to which we refer the reader.

Case VI. Three sides being given, to find the angles.

Example. In the oblique-angled plane triangle A B C (*fig.* 6.) are given the side A B = 52, the side A C = 74,5, and the side B C = 42; required the angles A, B, and C.

Geomerically

Geometrically. 1. Make the line AC=74,5, from a ine of equal parts.

2. Take 52, the length of AB between the points of the compaſſes, and, ſetting one foot in A, with the other deſcribe the arch *de*.

3. Take 42, the length of BC, between the points of the compaſſes, and, ſetting one foot in C, with the other deſcribe the arch *fg*, interſecting the former in B.

4. From the interſection B draw right-lines to the points A and C, and the triangle is conſtructed; and the angles may be meaſured by the line of chords.

But to perform it arithmetically it will be,

As the baſe AC (*plate* LXXVI. *fig.* 8.) =74,5,= - - -	1.8721563
To the ſum of the ſides AB, BC=94=	1.9731279
So is the diff. of the ſides AB, BC=10=	1.0000000
To the difference of the ſegments AF, CF, 12,5= - - -	1.100971

Which, taken from AC=74,5, leaves twice CF=62, the half of which is 31=the leſſer ſegment FC. Then having the three ſides of a right-angled triangle, the angles are eaſily found.

Spherical TRIGONOMETRY, is the art whereby, from three given parts of a ſpherical triangle, the reſt are diſcovered.

Before we ſhew the method of ſolving the ſeveral caſes of ſpherical trigonometry, we ſhall lay down the following theorems.

Theorem I. In any right-angled ſpherical triangle it will be, as radius is to the ſine of the angle at the baſe, ſo is the ſine of the hypothenuſe to the ſine of the perpendicular; and, as radius to the co-ſine of the angle at the baſe, ſo is the tangent of the hypothenuſe to the tangent of the baſe.

Corollary 1. Hence it follows, that the ſines of the angles of any oblique ſpherical triangle ADC (*plate* LXXVI. *fig.* 12.) are to one another, directly, as the ſines of the oppoſite ſides.

Corollary 2. It follows, moreover, that, in right-angled ſpherical triangles ABC, DBC, (*fig.* 12.) having one leg BC common, the tangents of the hypothenuſes are to each other, inverſely, as the co-ſines of the adjacent angles.

Theorem II. In any right-angled ſpherical triangle (ABC, *fig.* 11.) it will be, as radius is to the co-ſine of one leg, ſo is the co-ſine of the other leg to the co-ſine of the hypothenuſe.

Corollary. Hence, if two right-angled ſpherical triangles ABC, CBD, (*fig.* 12.) have the ſame perpendicular BC, the co-ſines of their hypothenuſes will be to each other, directly as the co-ſines of their baſes.

Theorem III. In any ſpherical triangle it will be, as radius is to the co-ſine of either angle, ſo is the co-ſine of the adjacent leg to the co-ſine of the oppoſite angle.

Corollary. Hence, in right-angled ſpherical triangles, having the ſame perpendicular, the co-ſines of the angles at the baſe will be to each other, directly, as the ſines of the vertical angles.

Theorem IV. In any right-angled ſpherical triangle it will be, as radius is to the ſine of the baſe, ſo is the tangent of the angle at the baſe to the tangent of the perpendicular.

Corollary. Hence it follows, that, in right-angled ſpherical triangles, having the ſame perpendicular, the ſines of the baſes will be to each other, inverſely, as the tangents of the angles at the baſes.

Theorem V. In any right-angled ſpherical triangle it will be, as radius is to the co-ſine of the hypothenuſe, ſo is the tangent of either angle to the co-tangent of the other angle.

Lemma. As the ſum of the ſines of two unequal arches is to their difference, ſo is the tangent of half the ſum of thoſe arches to the tangent of half their difference: and, as the ſum of the co-ſines is to their difference, ſo is the co-tangent of half the ſum of the arches to the tangent of half the difference of the ſame arches.

Theorem VI. In any ſpherical triangle ABC (*plate* LXXVI. *fig.* 13.) it will be, as the co-tangent of half the ſum of the two ſides is to the tangent of half their difference, ſo is the co-tangent of half the baſe to the tangent of the diſtance (DE) of the perpendicular from the middle of the baſe.

Corollary. Since the laſt proportion, by permutation, becomes co-tang. $\frac{AC+BC}{2}$: co-tang. AE :: tang. $\frac{AC-BC}{2}$: tang. DE, and as the tangents of any two arches are, inverſely, as their co-tangents; it follows, therefore, that tang. AE : tang. $\frac{AC+BC}{2}$ :: tang. $\frac{AC-BC}{2}$: tang. DE; or, that the tangent of half the baſe is to the tangent of half the ſum of the ſides, as the tangent of half the difference of the ſides to the tangent of the diſtance of the perpendicular from the middle of the baſe.

Theorem VII. In any ſpherical triangle ABC, it will be, as the co-tangent of half the ſum of the angles at the baſe, is to the tangent of half their difference, ſo is the tangent of half the vertical angle to the tangent of the angle which the perpendicular CD makes with the line CF biſecting the vertical angle.

The Solution of the Caſes of right-angled ſpherical Triangles. (*See* plate LXXVI. *fig.* 11.)

Caſe	Given	Sought	Solution.
1	The hyp. AC and one angle A	The oppoſite leg BC	As radius : ſine hyp. AC :: ſine A : ſine BC (by the former part of theorem 1.)
2	The hyp. AC and one angle A	The adjacent leg AB	As radius : co-ſine of A :: tang. AC : tang. AB (by the latter part of theorem 1.)
3	The hyp. AC and one angle A	The other angle C	As radius : co-ſine of AC :: tang. A : co-tang. C (by theorem 5.)
4	The hyp. AC and one leg AB	The other leg BC	As co-ſine AB : radius :: co-ſine AC : co-ſine BC (by theorem 2.)
5	The hyp. AC and one leg AB	The oppoſite angle C	As ſine AC : radius :: ſine AB : ſine C (by the former part of theorem 1.)
6	The hyp. AC and one leg AB	The adjacent angle A	As tang. AC : tang. AB :: radius : co-ſine A (by theorem 1.)
7	One leg AB and the adjacent angle A	The other leg BC	As radius : ſine AB :: tangent A : tangent BC (by theorem 4.)
8	One leg AB and the adjacent angle A	The oppoſite angle C	As radius : ſine A :: co-ſine of AB : co-ſine of C (by theorem 3.)
9	One leg AB and the adjacent angle A	The hyp. AC	As co-ſine of A : radius :: tang. AB tang. AC (by theorem 1.)
10	One leg BC and the oppoſite angle A	The other leg AB	As tang. A : tang. BC :: radius : ſine AB (by theorem 4.)
11	One leg BC and the oppoſite angle A	The adjacent angle C	As co-ſine BC : radius :: co-ſine of A : ſin. C (by theorem 3.)
12	One leg BC and the oppoſite angle A	The hyp. AC	As ſin. A : ſin. BC :: radius : ſin. AC (by theorem 1.)
13	Both legs AB and BC	The hyp. AC	As radius : co-ſine AB :: co-ſine BC : co-ſine AC (by theorem 2.)
14	Both legs AB and BC	An angle, ſuppoſe A	As ſine AB : radius :: tang. BC tang. A (by theorem 4.)
15	Both angles A and C	A leg, ſuppoſe AB	As ſin. A : co-ſine C :: radius : co-ſine AB (by theorem 3.)
16	Both angles A and C	The hyp. AC	As tang. A : co-tang. C :: radius : co-ſine AC (by theorem 5.)

Note. The 10th, 11th, and 12th cases are ambiguous; since it cannot be determined by the data, whether A B C, and AC, be greater or less than 90 degrees each.

The Solution of the Cases of oblique spherical Triangles. (*See* plate LXXVI. *fig.* 12, 13.)

Case	Given	Sought	Solution.
1	Two sides AC, BC, and an angle A opposite to one of them	The angle B opposite to the other	As sine B C : sine A : : sine AC : sine B (by cor. 1. to theor. 1.) Note, this case is ambiguous when BC is less than AC; since it cannot be determined from the data whether B be acute or obtuse.
2	Two sides AC, BC, and an angle A opposite to one of them	The included angle A C B	Upon AB produced (if need be) let fall the perpendicular CD: Then (by theorem 5.) rad. : co-sine AC : : tang. A : co-tang. A C D; but (by cor. 2. to theor. 1.) as tang. BC : tang. AC : : co-sine A C D : co-sine B C D. Whence ACB = ACD ± B C D is known.
3	Two sides AC, BC, and an angle opposite to one of them	The other side A B	As rad. : co-sine A : : tang. AC : tang. AD (by theor. 1.) and (by cor. to theo. 2.) as co-sin. AC : co-sin. BC : : co-sin. AD : co-sin. BD. Note, This and the last case are both ambiguous when the first is so.
4	Two sides AC, AB, and the included angle A	The other side B C	As rad. : co-sin. A : : tan. AC : tan. AD (by theo. 1.) whence BD is also known: Then (by cor. to theorem 2.) as co-sine AD : co-sine BD : : co-sine AC : co-sine B C.
5	Two sides AC, AB, and the included angle A	Either of the other angles suppose B	As rad. : co-sine A : : tang. AC : tang. A D (by theor. 1.) whence B D is known; then (by cor. to theor. 4.) is sine B D : sine AD : : tang. A : tang. B.
6	Two angles A, A C B and the side AC betwixt them	The other angle B	As rad. : co-sine AC : : tang. A : co-tang. ACD (by theo. 5.) whence B C D is also known: Then (by cor. to theor. 3.) as sine A C D : sine B C D : : co-sine A : co-sine B.
7	Two angles A, A C B, and the side A C betwixt them	Either of the other sides, suppose B C	As rad. : co-sine AC : : tang. A : co-tang. ACD (by theo. 5.) whence BCD is also known: Then, as co-sine B C D : co-sine A C D : : tang. A C : tang. B C (by cor. 2. to theor. 1.)
8	Two angles A, B, and a side A C opposite to one of them	The side B C opposite the other	As sine B : sine A C : : sine A : sine BC (by cor. 1. to theor. 1.)
9	Two angles A, B, and a side A C opposite to one of them	The side A B betwixt them	As rad. : co-sine A : : tang. AC : tang. AD (by theo. 1.) and as tang. B : tang. A : : sine A D : sine B D (by cor. to theor. 4.) whence A B is also known.
10	Two angles A, B, and a side AC opposite to one of them	The other angle ACB	As rad. : co-sine AC : : tang. A : co-tang. ACD) by theo. 5.) and as co-sine A : co-sine B : : sine A C D : sine BCD (by cor. to theorem 3.) whence A C B is also known.
11	All the three sides A B, A C, and B C	An angle suppose A	As tan. $\frac{1}{2}$AB : tang. $\frac{AC+BC}{2}$: : tang. $\frac{AC-BC}{2}$: tang. DE, the distance of the perpendicular from the middle of the base (by cor. to theor. 6.) whence A D is known: Then, as tang. A C : tang. A D : : rad. : co-sine A (by theorem 1.)
12	All the three angles A, B, and A C B	A side, suppose A C	As co-tang. $\frac{ABC+A}{2}$: tang. $\frac{ABC-A}{2}$: : tan. $\frac{ACB}{2}$: tan. of the angle included by the perpendicular and a line bisecting the vertical angle; whence ACD is also known: Then (by theor. 5.) tang. A : co-tang. A C D : : rad. co-sine A C.

Note, In letting fall your perpendicular, let it always be from the end of a given side and opposite to a given angle.

TRILLION, in arithmetick, the number of a billion of billions. After billions we reckon by trillions, which makes a class of numeration, and is divided, like the other classes, into three places: thus we say, trillions, tens of trillions, hundreds of trillions, &c.

TRIM *of a Ship*, is the best posture, proportion of ballast, and hanging of her masts for sailing.

Hence, to find the best way of making a ship sail swiftly, is to find her trim.

TRIMACRUS, or TRIMACER, in the ancient prosody, a foot in verse, consisting of three long syllables.

TRIMMERS, in architecture, pieces of timber framed at right angles to the joints against the ways for chimnies, and well-holes for stairs.

TRINE, in astrology, is the aspect or situation of one star with regard to another, when they are distant 120°; marked thus △.

TRINGLE, in architecture, a name common to several little square members, or ornaments, as reglets, listels, and plat-bands.

TRINGLE is more particularly used for a little member fixed exactly over every triglyph, under the plat-band of the architrave; from whence hang down the guttæ or pendent drops.

TRINITY, *Trinitas*, *Trias*, in theology, the ineffable mystery of three persons in one God, Father, Son, and Holy Spirit.

This term was first used by *Theophilus Antiochenus*; the Greek, and indeed all the heathen languages, having no word to express the spiritual idea of the Hebrew אלהים ALEHIM, which in the English translation of the bible (for want of a better name) is rendered GOD, though it only declares *one* of his *attributes*, instead of his *personality*. That JEHOVAH is *good* (for that is the sense of the word God) must be granted; but the word ALEHIM implies *the persons in covenant* (Father, Son, and Spirit) for the salvation of men, which is a more weighty meaning, and not fully expressed by the term *Trinity*, which only declares the idea of *three persons in one essence*. However, it is the best term we have for the expression of this doctrine concerning the mode of God's existence.

As to the doctrine itself, it is very excellently defined by the church of England, in her communion service, viz. that the Almighty "is one God, one Lord; not "one only person; but three persons in one substance: "for that which we believe of the glory of the Father, "the same we believe of the Son, and of the Holy Ghost, "without any difference or inequality." Thus (according to the Athanasian creed) "the godhead of the Father, "of the Son, and of the Holy Ghost, is ALL ONE: "the glory equal; the majesty coëternal."

That this doctrine was revealed to the first patriarchs; that the corruption of it by the Chaldeans, Egyptians, &c. produced much of the Pagan mythology; that this abuse

abuſe of the doctrine may be traced in various parts of, if not all over, the world; and that the faithful reception of it is eſſential to the very being of Chriſtianity; we muſt refer our readers to the introduction of a late book, (entitled HORÆ SOLITARIÆ, or eſſays upon the DIVINE NAMES in ſcripture) where theſe points are handled at large, and with great induſtry, from the moſt ancient authors. We will conclude this article with an extract from that volume, concerning the maintenance of this doctrine by the ancient Jews.

"The ancient Jews, before *Chriſt*, underſtood the "diſtinction of the perſons in the godhead, and the "doctrine of the Trinity. Their *Cabbaliſts* inſiſted that "the doctrine was to be found in the very conſtruction "of the name יהוה JEHOVAH. They obſerved, that, "though the name contains *four* letters (whence it is "called τετραγραμματον) there are but *three different* letters "in its compoſition. Thus, according to them, י *Jod* "ſignifies the *Father*, the maker of all things; ו *Vau*, a "conjunction copulative, denotes the bleſſed *Spirit* pro-"ceeding from the *Father* and the *Son* conjointly; and "ה *He* implies the *Son* of God. They have alſo a ſaying, "that God made all things in the letter ה; alluding to "his creation of all things by the *Word*. And, laſtly, "that ה is doubled in this name, to demonſtrate *both* "*Natures* of the Meſſiah.

"Though this criticiſm (if it may be ſo called) is "quite cabbaliſtical; yet it ſhews (what it is here pro-"duced to ſhew) that the doctrine of the Trinity was "the current and eſtabliſhed opinion. A better proof "ariſes from the comments and verſions of their moſt "learned and celebrated authors. R. Simeon Ben Jochai, "treating of the name ALEHIM, ſays; 'Come and ſee 'the myſtery of this word: there are three degrees or 'affinities, and each degree is to be *diſtinguiſhed* by itſelf; 'but the *three* are *one*, and *united* to each other *in one*; 'nor is one to be *divided* from another.' The ſame "rabbin, and Jonathan the Chaldee paraphraſt, who "both wrote many years before Chriſt, treating on Iſaiah "vi. 1. where the Lord [Adonai] is repreſented ſitting "upon a throne, apply the paſſage to the *Meſſiah*. The "former of theſe has this remarkable expoſition of the "*Triſagion*, or *Thrice-Holy*, in the third verſe of the ſame "chapter: קדש זה אב קדש זה בן קדש זה רוח הקדש: 'h. e. HOLY, *that is, the* FATHER; HOLY, *that* '*is, the* SON; HOLY, *that is, the* HOLY SPIRIT.' "Theſe are further evidences, that the doctrine of the "Trinity is not a Chriſtian *novelty*, as the modern Jews "and ſome other people would endeavour to perſuade "us." See *Horæ Solitariæ*, under the name JEHOVAH, p. 88.

TRINITY-*Houſe*, is a kind of college at Deptford, belonging to a corporation of ſea-faring perſons, who have power by the king's charter to take cognizance of ſuch as deſtroy ſea-marks, to correct the faults of ſailors, &c. and to take care of ſeveral other things belonging to navigation and the ſeas, the examination of young officers, &c. anno 8 Elizabeth.

TRINOMIAL, or TRINOMIAL *Root*, in mathematicks, is a root conſiſting of three parts, connected together by the ſigns + or −. As $x+y+z$; or $x-y-z$.

TRIO, in muſick, a part of a concert, wherein three perſons ſing; or more properly, a muſical compoſition conſiſting of three parts. Trios are the fineſt kind of compoſition, theſe and recitativos are what pleaſe moſt in concerts.

TRIOCTILE, in aſtrology, an aſpect or ſituation of two planets with regard to the earth, when they are three octants, or eighth parts of a circle, i. e. 135° diſtant from each other.

TRIPARTITE, *Tripartitus*, ſomething divided into three or made by three parties, as an indenture tripartite, &c.

TRIPARTITION, is a diviſion by three, or the taking the third part of any number or quantity.

TRIPETALOUS FLOWERS, in botany, are thoſe whoſe corolla conſiſts of three petals, or leaves.

TRIPHTHONG, in grammar, an aſſemblage or concourſe of three vowels in the ſame ſyllable.

TRIPLE, in muſick, is one of the ſpecies of meaſure or time.

Triple time conſiſts of many different ſpecies, each of which has its varieties. The common name of triple is taken hence, that the whole or half meaſure is diviſible into three equal parts, and is beaten accordingly.

The firſt ſpecies is called the ſimple triple, wherein the meaſure is equal to three ſemi-breves, three minims, three crotchets, three quavers, or three ſemi-quavers, which are marked thus, $\frac{3}{1}$, or $\frac{3}{2}$, $\frac{3}{8}$, $\frac{3}{4}$, or $\frac{3}{16}$; but the laſt is not much uſed, except in church muſick.

In all theſe the meaſure is divided into three equal parts or times, called thence triple time, or the meaſure of three times, whereof two are beat down, and the third up.

The ſecond ſpecies is the mixed triple; its meaſure is equal to ſix crotchets, or ſix quavers, or ſix ſemi-quavers, and accordingly marked $\frac{6}{4}$, or $\frac{6}{8}$, or $\frac{6}{16}$; but the laſt is ſeldom uſed.

TRIPLICATE RATIO, is the ratio which cubes bear to each other. This ratio is to be diſtinguiſhed from triple ratio, and may be thus conceived: in the geometrical proportions 2, 4, 8, 16, 32, as the ratio of the firſt term (2) is to the third (8) duplicate of that of the firſt to the ſecond, of the ſecond to the third: ſo the ratio of the firſt to the fourth is ſaid to be triplicate of the ratio of the firſt to the ſecond, or of that of the ſecond to the third, or that of the third to the fourth, as being compounded of three equal ratios.

TRIPLICITY, or TRIGON, among aſtrologers, is a diviſion of the ſigns according to the number of the elements, each diviſion conſiſting of three ſigns.

TRIPLOIDES, a ſurgeon's inſtrument, with a threefold baſis, uſed in the reſtoring great depreſſions of the ſkull.

TRIPOD, *Tripos*, in antiquity, a famed ſacred ſeat or ſtool ſupported by three feet, whereon the prieſts and ſibyls were placed to render oracles.

TRIPOLI, in natural hiſtory, the name of an earthy ſubſtance much uſed by the lapidaries to poliſh ſtones, and by the braziers, and other the like artiſts, to clean metalline veſſels. It is of two kinds, the yellowiſh and rediſh white; the yellowiſh white kind is called by authors alana gleba, tripolis and terra tripolitana; this is the produce of Germany, Saxony, and France; there is alſo of it in the neighbourhood of Venice, but it is found in greateſt plenty in many parts of Africa. The rediſh tripoli is of our own production, though not peculiar to our country; it is found in great abundance on Mendip-hills in Somerſetſhire, and not leſs plentifully in many parts of Germany. This is well known in the ſhops as a ſubſtance of great uſe in poliſhing braſs, but is not applied to any of the other uſes of the yellowiſh kind: this, like the former, is moſt frequently found in detached maſſes, and while in the earth is tolerably ſoft, and eaſily falls into flakes.

TRIPPING, in heraldry, denotes the quick motion of all ſorts of deer, and ſome other creatures, repreſented with one foot up as it were on a trot. In ſpeaking of lions, they ſay paſſant, inſtead of tripping.

TRIPTOTES, in grammar, defective nouns which have only three caſes; ſuch is fors, fortis, forte; or dica, dicam, dicas.

TRISECTION, or TRISSECTION, the dividing a thing into three. The term is chiefly uſed, in geometry, for the diviſion of an angle into three equal parts.

The triſection of an angle geometrically is one of thoſe great problems whoſe ſolution has been ſo much ſought by mathematicians for theſe 2000 years, being in this reſpect on a footing with the quadrature of the circle, and the duplicature of the cube angle.

TRISMEGISTUS, an epithet or ſurname given to one of the two Hermes's, or Mercurius's, kings of Thebes, in Egypt, who was contemporary with Moſes.

TRISPAST, *Triſpaſton*, in mechanicks, a machine with three pullies, or an aſſemblage of three pullies, for raiſing great weights.

TRISYLLABLE, in grammar, a word conſiſting but of three ſyllables.

TRITON, in poetry, a ſea demi-god, held by the ancients to be an officer or trumpeter of Neptune, attending on him, and carrying his orders and commands from ſea to ſea.

TRITONE, TRITENO, in muſick, a falſe concord, conſiſting of three tones, or a greater third and a greater tone. Its ratio or proportion in numbers is of 45 to 32. In dividing the octave we find on one ſide the falſe fifth, and the tritone on the other.

TRITU-

TRITURATION, Tritura, or Tritus, in pharmacy, grinding, the act of reducing a solid body into a subtile powder, called also levigation, or pulverisation.

Trituration is also used, in medicine, for the action of the stomach on the food, whereby it is fitted for nutriment.

TRIUMPH, *Triumphus*, a solemnity practised by the ancient Romans, to do honour to a victorious general.

There were two sorts of triumphs, the greater and the less, particularly called ovation: of these, the triumph was much the more splendid procession. None were capable of this honour but the dictator, consuls, and prætors; though there are examples to the contrary, as particularly in Pompey the Great, who had a triumph decreed him when he was only a Roman knight, and had not yet reached the senatorial age.

The triumph was the most pompous shew among the ancients: authors usually attribute its invention to Bacchus, and tell us that he first triumphed upon the conquest of the Indies; and yet this ceremony was only in use among the Romans. The Grecians had a custom which resembled the Roman triumph; for the conquerors used to make a procession through the middle of their city, crowned with garlands, repeating hymns and songs, and brandishing their spears: the captives were also led by them, and all their spoils exposed to publick view. The order of a Roman triumph was chiefly thus: the senate having decreed the general a triumph, and appointed a day, they went out of the city gate to meet the conqueror, and marched in order with him through the city. The cavalcade was led up by the musicians, who had crowns on their heads; after them came several chariots with plans and maps of the cities and countries subdued, done in relievo: they were followed by the spoils taken from the enemy, their horses, arms, gold, silver, machines, tents, &c. After these came the kings, princes, or generals subdued, loaden with chains, and followed by mimicks or buffoons, who insulted over their misfortunes. Next came the officers of the conquering troops with crowns on their heads. Then appeared the triumphal chariot, in which was the conqueror, richly clad in a purple robe, embroidered with gold, setting forth his glorious atchievements. His buskins were beset with pearl, and he wore a crown, which at first was only laurel, but afterwards gold. One hand held a laurel branch, the other a truncheon. At his feet were his children, or sometimes on the chariot horses. It is added, that the publick executioner was behind him, to remind him from time to time that these honours were transitory, and would not screen him from the severity of the laws, if he should ever be found delinquent. As the triumphant chariot passed along, they strewed flowers before it. The musick played in praise of the conqueror, amidst the loud acclamations of the people, crying Io Triumphe. The chariot was followed by the senate clad in white robes, and the senate by such citizens as had been set at liberty or ransomed. The procession was closed by the sacrificers, and their officers and utensils, with a white ox led along for the chief victim. In this order they proceeded through triumphal arches to the capitol, where the victims were slain. In the mean time all the temples were open; the altars loaden with offerings and incense; games and combats were celebrated in the publick places, and rejoicings appeared every where. What was horrible amidst all this mirth, was, that the captives, when arrived at the forum, were led back to prison and strangled, it being a point of religion with them not to touch the victims till they had taken full revenge of their enemies. The rites and sacrifices over, the triumpher treated the people in the capitol, under the porticoes, and sometimes in the temple of Hercules.

An ingenious author observes, that it was the greatest diminution of the Roman glory imaginable, that, in their institution of publick triumphs, they led their enemies in chains, when they were prisoners. It is to be allowed, that doing all honour to heroes, above the rest of mankind, must needs conduce to the glory and advantage of a nation; but what shocks the imagination to reflect upon, is, that a polite people should think it reasonable, that an unhappy man, who was no way inferior to the victor, but by the chance of war, should be led like a slave at the wheels of his chariot. This behaviour to the conquered had no foundation in nature or policy, only to gratify the insolence of an haughty people, who triumphed over barbarious nations, by acting what was fit only for those very babarians to practise. It seems wonderful, that they who were so refined as to take care that, to compleat the honour done to the victorious officer, no power should be known above him in the empire, on the day of his triumph; but that the consuls themselves should be but guests at his table that evening; could not admit the man of chief note among his prisoners to be one of the company. This would have improved the gladness of the occasion, and the victor had made a much greater figure, in that no other man appeared unhappy on this day, than because no other appeared greater.

The same baseness of spirit (for it deserves no softer name) appears, with the applause of the Greek world, in the celebrated Iliad of Homer; where *Achilles* is represented dragging the dead body of *Hector*, whom he had slain, behind his chariot all round Troy. Savages might act and think in this manner; but true magnanimity could not have descended to such mean brutalities.

TRIUMVIR, one of the three persons who govern absolutely and with equal authority in a state.

The word is little used but in the Roman history. Cæsar, Crassus, and Pompey, were the first triumvirs, i. e. the first who divided the government of the republick among them.

TRIUMVIRATE, *Triumviratus*, an absolute government administered by three persons with equal authority. There were two famous triumvirates at Rome. Pompey, Cæsar, and Crassus, established the first; and Augustus, Mark Antony, and Lepidus, the second.

TROCHAICK, *Trochaicus*, in the Latin poetry, a kind of verse, consisting of trochees; or wherein that foot predominates, as the iambus does in the iambick.

TROCHANTER, in anatomy, called also rotator, of which there are the major and minor, or greater and less; they are two apophyses in the upper part of the thigh-bone, in which the tendons of many muscles are terminated. See Thigh.

TROCHE, *Trochiscus*, in pharmacy, a form of medicine made to be held in the mouth to dissolve gradually.

Latin authors call them pastilli, rotulæ, placentulæ, orbes, and orbiculi, and the English, frequently, lozenges.

TROCHEE, *Trochæus*, in the Greek and Latin poetry, a kind of foot, consisting of two syllables, the first long, the latter short.

TROCHITES, or Trochitæ, in natural history, a kind of figured fossile stones, resembling parts of plants.

TROCHLEA, one of the mechanical powers, usually called a pulley.

TROCHLEARES, in anatomy, a name given to the oblique muscles of the eye.

TROCHOID, in geometry, a curve more generally known by the name of cycloid.

TRONAGE, an ancient customary toll, paid for weighing of wool. This word is particularly mentioned in a charter granted to the mayor and citizens of London; in which city there is an officer, called tronator, whose business it is to weigh the wool that is brought thither.

TROOP, a small body of horse or dragoons, about 50 or 60, sometimes more, sometimes less; commanded by a captain. Each troop, besides a captain, has a lieutenant, cornet, quarter-master, and three corporals, who are the lowest officers of a troop.

TROPÆOLUM, in botany, a genus of the octandria monogynia class. The calix consists of one calcarated leaf; and the corolla of five unequal petals; and there are three dry berries. The species are three, all natives of Peru.

TROPE, in rhetorick, a kind of figure of speech, whereby a word is removed from its first and natural signification, and applied with advantage to another thing, which it does not originally mean; but only stands for it, as it has a relation to, or connection with it: as in this sentence, God is my rock. Here the trope lies in the word Rock, which being firm and immoveable, excites in our minds the notion of God's unfailing power, and the steady support which good men receive from their dependance upon him.

TROPHY, *Tropæum*, among the ancients, a pile or heap

heap o. arms of a vanquiſhed enemy, raiſed by the conqueror in the moſt eminent part of the field of battle.

The trophies were uſually dedicated to ſome of the gods, eſpecially Jupiter. The name of the deity to whom they were inſcribed, was generally mentioned, as was that alſo of the conqueror. The ſpoils were at firſt hung upon the trunk of a tree; but inſtead of trees, ſucceeding ages erected pillars of ſtone, or braſs, to continue the memory of their victories. To demoliſh a trophy was looked upon as a kind of ſacrilege, becauſe they were all conſecrated to ſome deity.

The repreſentation of a trophy is often to be met with on medals of the Roman Emperors, ſtruck on occaſion of victories; wherein, beſides arms and ſpoils, are frequently ſeen one or two captives by the ſides of the trophy.

TROPHY-MONEY, denotes certain money annually raiſed in the ſeveral counties of the kingdom, towards providing harneſs, and maintaining the militia.

TROPICKS, in aſtronomy and geography, are two circles ſuppoſed to be drawn on each ſide of the equinoctial, and parallel thereto. That on the north-ſide of the line is called tropick of cancer, and the ſouthern tropick has the name of capricorn, as paſſing through the beginning of thoſe ſigns. They are diſtant from the equinoctial 23° 29′. Two circles drawn at the ſame diſtance from the equator on the terreſtrial globe, have the ſame names in geography, and they include that ſpace or part of the ſphere, which is called the torrid zone, becauſe the ſun is, at one time or other, perpendicular over every part of that zone, and extremely torrifies or heats it.

TROT, in the menage, one of the natural paces of a horſe, performed with two legs in the air and two on the ground, at the ſame time, croſs-wiſe like St. Andrew's croſs, and continuing ſo alternately to raiſe the hind-leg of the one ſide, and the fore-leg of the other ſide at once, leaving the other hind and fore-leg upon the ground, till the former come down. In this motion the nearer the horſe takes his limbs from the ground, the opener, the evener, and ſhorter his trot will be. If he takes up his feet ſlovenly, it is a ſign of ſtumbling and lameneſs; if he treads narrow or croſs, it betokens interfering or failing; if he treads long, it ſhews over-reaching; if he ſteps uneven, it beſpeaks toil and wearineſs.

TROVER, in law, an action which a man hath againſt one that, having found any of his goods, refuſeth to deliver them upon demand.

TROUGH *of the Sea*, is the hollow or cavity made between two waves or billows, in a rolling ſea.

TROY-WEIGHT, in commerce. See WEIGHT.

TRUCE, in the art of war, denotes a ſuſpenſion of arms, or a ceſſation of hoſtilities between two armies, in order to ſettle articles of peace, bury the dead, or the like.

TRUCKMAN, DRAGOMAN, or DROGMAN, in the countries of the Levant, ſignifies an interpreter. See DRAGOMAN.

TRUCKS, among gunners, round pieces of wood, fixed on the axle-tree of carriages, to move the ordnance at ſea, and ſometimes alſo at land.

TRUE, ſomething agreeable to the reality of things, or to truth.

TRUE *Place of a Planet or Star*, in aſtronomy, is a point of the heavens, ſhewn or pointed out by a right-line, drawn from the centre of the earth, through the centre of the planet or ſtar.

TRUFFLES, *Tubera Terræ*, in natural hiſtory, a kind of ſubterraneous vegetable production, not unlike muſhrooms, being a genus of fungi, which grows under the ſurface of the earth. See FUNGUS.

The truffle is only a fleſhy tubercle, covered with a hard ſort of cruſt, rough, and ſomewhat regularly furrowed on the ſurface, almoſt like the cypreſs-nut. It does not riſe above the ſurface of the earth, but lies concealed about half a foot below it. Great numbers of them are found in the ſame place, of different ſizes: ſome of them are now and then found of a pound weight, or even a pound and a quarter; theſe laſt are but rare, and Pliny only mentions their being of a pound weight.

They grow at the feet and under the ſhades of trees, ſometimes about the roots of ſtones, and ſometimes in clear earth. Their favourite trees are either the white or green oak, as the elm is that of the morellæ. They begin to be found when warm weather firſt ſucceeds the cold, ſooner or later, as the ſeaſon is more or leſs mild; for they have ſometimes been very rare after hard winters. At firſt they appear only like little round peas, red without and white within. Theſe peas grow larger by degrees; from that time they take out of the ground what they commonly call white truffles; theſe are of themſelves inſipid, and people dry them as an ingredient for ragouts, becauſe they keep better when dried, than marbled ones do. It is a common opinion that truffles, which have been once removed from their places, are never after capable of being nouriſhed, even when put in ſome earth from which they were originally taken: but if one leave them there for a certain ſeaſon, without diſturbing them, they grow inſenſibly larger; their bark becomes black, rough, and unequal, though they always retain their whiteneſs within. Hitherto they have very little ſmell or taſte, and can only be uſed in ragouts; theſe are always called the firſt white truffles, and are not to be made a different ſpecies from the marbled or black ones gathered in the end of autumn, and even in the winter after the froſts are begun.

When the truffles are at maturity, they have a very good ſmell and taſte; and are fit to be dug from the month of October to the end of December; and ſometimes to the end of February and March, when they are even at that time marbled; whereas thoſe gathered from the month of April till July and Auguſt, are only white.

If people neglect to look at the truffles when arrived at a due degree of maturity, they rot; and then we may obſerve the reproduction of the truffle; becauſe, after ſome time, we ſee ſeveral bunches of other young truffles filling up the places of the rotten ones. Theſe young truffles are nouriſhed till the firſt colds come on; and if the froſts are not intenſe, they get over the winter, and furniſh us betimes with the freſh green truffles.

As to the virtues of truffles, the common opinion is, that they are hot; Galen, however, according to Matthiolus, looks upon them as indifferent, and the baſis of all other ſeaſoning; and, indeed, it is to this purpoſe they are uſed in all ragouts. Avicenna ſpeaks of them in a manner quite different, and ſays, they engender thick humours more than any other food: that they are hard of digeſtion, heavy on the ſtomach, and, when much uſed, have a tendency to bring on an apoplexy and palſy. Theſe two authors may be reconciled, if we conſider two qualities in the truffle, which are capable of producing two different effects: firſt, they may prove hot of themſelves, by emitting their volatile ſalts into the ſtomach; or, by being mixed with ſalt, pepper, and other ſpices, which they drink up like a ſpunge: in the ſecond place, they may prove of hard digeſtion, when eaten immoderately by a perſon of a weak ſtomach; in which caſe, they produce bad effects, ſtagnate, and form themſelves into a glareous ſubſtance, which diſorders the ſtomach, and which may be occaſioned by the cold quality aſcribed to them by Galen. As a proof that the truffle is of hard digeſtion, it has this in common with other fruits, that it grows hard in ſpirit of wine, and is with difficulty diſſolved in water.

TRUMPET, a muſical inſtrument, the moſt noble of all portable ones of the wind kind, uſed chiefly in war, among the cavalry, to direct them in the ſervice.

Marine-TRUMPET, is a muſical inſtrument conſiſting of three tables, which form its triangular body.

It has a very long neck, with one ſingle ſtring, very thick, mounted on a bridge, which is firm on one ſide, but tremulous on the other. It is ſtruck by a bow with one hand, and with the other the ſtring is preſſed, or ſtopped, on the neck by the thumb.

It is the trembling of the bridge, when ſtruck, that makes it imitate the ſound of a trumpet, which it does to that perfection, that it is ſcarce poſſible to diſtinguiſh the one from the other; and this is what has given it the denomination of marine-trumpet; though, in propriety, it is a kind of monochord.

Harmonical-TRUMPET, an inſtrument that imitates the ſound of a trumpet; which it reſembles in every thing, excepting that it is longer, and conſiſt of more branches: it is generally called ſackbut.

Speaking-TRUMPET, is a tube from ſix to fifteen feet long, made of tin, perfectly ſtraight, and with a very large aperture; the mouth-piece being big enough to receive both lips. This is uſed at ſea.

TRUMPET-

TRUMPET-SHELL, the English name of the buccinum of authors.

TRUNCATED, in general, is an appellation given to such things as have, or seem to have, their points cut off; thus we say, a truncated cone, pyramid, leaf, &c.

TRUNDLE, a sort of carriage with low wheels, whereon heavy and cumbersome burdens are drawn.

TRUNK, *Truncus*, among botanists, denotes the stem, or body of a tree; or that part between the ground and the place where it divides into branches.

In anatomy, trunk is used for the busto of a human body, exclusive of the head and limbs, comprehending the abdomen and thorax.

TRUNNIONS *of a Piece of Ordnance*, are those knobs or bunches of the gun's metal, which bear her up on the cheeks of the carriage: and hence the trunnion-ring is the ring about a cannon, next before the trunnions.

TRUSS, *Trussa*, a bundle, or certain quantity of hay, straw, &c. A truss of hay is to contain 56lb. or half a hundred weight; 36 trusses make a load.

TRUSS, is also used for a sort of bandage or ligature, made of steel or the like matter, wherewith to keep up the parts, in those who have hernias or ruptures.

TRUSS *of Flowers*, is used, by florists, to signify many flowers growing together on the head of a stalk, as in the cowslip, auricula, &c.

TRUSS *of Forage*, is as much as a trooper can carry on his horse's crupper.

TRUSSES, in a ship, are ropes made fast to the parrels of a yard, either to bind the yard to the mast when the ship rolls, or to hale down the yards in a storm, &c.

TRUSSING, in falconry, is a hawk's raising any fowl or prey aloft; first soaring up, and then descending with it to the ground.

TRUST, in law, signifies, in general, that confidence which one person reposes in another; and in case of non-performance, or breach of this trust, the remedy is by bill in equity, as the common law usually takes no notice of trusts.

TRUSTEE, one who has an estate, or money, put or trusted in his hands, for the use of another. Where two or more persons are appointed trustees, if one of them only receives all, or the greatest part, of the profits of the lands, &c. and is in arrear, and unable to satisfy the person to whom he is seised in trust, the other, in that case, shall not be answerable for more than comes to his hands.

TRUTH, *Veritas*, a term used in opposition to falshood, and applied to propositions which answer or accord, to the nature and reality of the thing whereof something is affirmed or denied.

Truth, according to Mr. Locke, consists in the joining or separating of signs, as the things signified by them do agree or disagree one with another. Now the joining or separating of signs is what we call making of propositions. Truth then, properly, relates only to propositions, whereof there are two sorts, mental and verbal; as there are two sorts of signs commonly made use of, viz. ideas and words. See IDEA and WORD.

Mental propositions are those wherein the ideas in our understanding are put together, or separated, by the mind perceiving or judging of their agreement or disagreement.

Verbal propositions are words put together, or separated, in affirmative or negative sentences: so that a proposition consists in joining or separating of signs; and truth consists in putting together, or separating those signs, according as the things they stand for agree or disagree.

Moral TRUTH consists in speaking things according to the persuasion of our minds, and is called also veracity.

Metaphysical, or Transcendental TRUTH, is nothing but the real existence of things conformable to the ideas which we have annexed to their names.

TRY, in the sea-language. A ship is said to try, or lie a-try, when no sails are abroad but the main-sail or mizzen-sail.

TUB, in commerce, denotes an indeterminate quantity or measure: thus, a tub of tea contains about 60lb. and a tub of camphor from 56 to 80lb.

TUBE, *Tubus*, in general, a pipe, conduit, or canal; a cylinder hollow withinside, either of lead, iron, wood, glass, or other matter, for the air, or some other fluid, to have a free passage, or conveyance through. See PIPE.

Small silver or leaden tubes are frequently used by surgeons, to draw off blood, matter, or water, from the different parts of the body.

The Construction of a draw TUBE, *for a Telescope*. The chief points to be regarded here are, that the tube be not troublesome by its weight, nor liable to warp and disturb the position of the glasses; so that every kind of tube will not serve in every case. See TELESCOPE.

TUBER, or TUBERCLE, in botany, a kind of round turgid root, in form of a knob or turnep. The plants which produce such roots are hence denominated tuberose, or tuberous plants.

TUBER, or TUBEROSITY, in medicine, is used for a knob, or tumour, growing naturally in any part; in opposition to tumours, which arise accidentally, or from disease.

TUBERCLES, among physicians, denote little tumours which suppurate and discharge pus, and are often found in the lungs, especially of consumptive persons.

TUBEROSE, polyanthos, in botany, a bulbous rooted plant, much admired for the fragrancy of its blossoms, which are produced in spikes on the upper part of a stem which rises four or five feet high.

TUBEROSE ROOTS, among botanists, are those which are composed of many fleshy tubercles, and either sit close to the stalk, as those of the garden ranunculus, or are suspended by fibres or threads; such are those of the potatoe, Jerusalem artichoke, peony, &c.

TUBIPORA, or TUBULARIA, a genus of submarine plants, belonging to the cryptogamia class, of the hardness of coral, and consisting of cylindrick tubes rising from a thin crust of the same sort of matter with themselves.

TUBULARIA FOSSILS, in natural history, the name of a species of coral found very often fossil in Germany and Italy, and composed of a great number of tubes, or longitudinal pipes, often resembling so many worms ranged perpendicularly in the mass.

TUBULI FOSSILIS, in natural history, the tubules or cases of sea-worms, found buried in the earth.

TUBULI LACTIFERI, in anatomy, the small tubes, or vessels, through which the milk flows to the nipples of womens breasts. See MILK.

TUCK *of a Ship*, the trussing or gathering up the quarter under water; which if she lie deep, makes her have a broad, or, as they call it, fat quarter, and hinders her steering, by keeping the water from passing swiftly to her rudder; and if this trussing lie too high above the water, she will want bearing for her works behind, unless her quarter be very well laid out.

TULIP, *Tulipa*, in botany, a genus of plants, whose flower is bell-shaped, and composed of six ovato-oblong, concave, erect petals; the stamina are six subulated filaments, topped with oblong erect quadrangular antheræ: the germen is oblong, taper, and three-cornered: it hath no style, but is crowned with a triangular, three-lobed, persistent stigma: the fruit is a triquetrous and trilocular capsule, containing a great many flat seeds, ranged over each other in a double order.

The tulip-root is bulbous, from which arises the stem, from a foot to two feet high, adorned at the base with a few pointed leaves, of a pale green colour; on the extremity of the stalk the flower is produced, which is much admired for the beauty of its fine stripes and rich colours.

This flower is probably a native of Turkey, of which the name is a proof, being derived from the Turkish word tulpent, which signifies a cap or turban; but though it be originally from that country, Holland is the great magazine of the finest and most curious tulips, which are raised there by the diligence of the florists of the low countries.

In Holland they reckon four principal sorts; 1. The early or spring tulips. 2. The double-flowered tulips. 3. The late expectant tulips. 4. The late striped tulips, with a yellow or white bottom.

The spring-tulips were formerly held in so great reputation in Holland, that the florists placed their highest ambition in the possession of them. This passion rose to that extravagance, from the year 1634 to 1637, that single roots were sold from 2000 to 5500 guilders; this madness was at last checked by the interposition of the states of Holland and West Friesland, April 27, 1637; since

ſince that time, the late blowers have gained the preference, and the ſpring tulips are no longer in ſuch high eſtimation: however, they are not to be caſt away, as ſome of them blow, in mild ſeaſons, ſo early as February, and are very pretty, particularly a ſort called the Duke Van-Tol; their principal beauty conſiſts in their cupping well, their bright and gay colours, and being well broke. There are ſome that have their leaves prettily and lightly variegated with yellow and green, for which they are the more valuable.

When the ſpring flowers are gone off, the double tulips ſucceed; theſe are large flowers, well filled with petals, and ſtanding a foot and a half or two feet high, of a very agreeable white, variegated with a bright lively red, making a delightful ſhew at a diſtance, and the variety of their forms and colours ſtrikes the eye very agreeably.

The late expectant tulips, as the Dutch call them, from the expectation they have of raiſing fine new flowers from them; they alſo call them tulips of one colour, or whole blowers: we, in England, call them breeding tulips, becauſe from them the moſt admired new flowers are produced; in Germany they have the name of mother tulips, becauſe we have nothing fine in the tulip kind but what owes its birth to them. They are not very beautiful in themſelves, but are very valuable for the reaſons above-mentioned, and a good floriſt ſhould never be without a conſiderable number of them in his garden, from which he may breed very fine tulips, a thing he muſt never hope to accompliſh but by their means, for theſe anſwer the ſame purpoſe in raiſing curious new tulips, as the ſeed does in hyacinths.

Many ſtrange whims have been practiſed in order to produce the variety of colours in the breeding tulips; ſome have been led by their capricious folly to cut two roots through the heart, and to imagine that they ſhould accompliſh their deſire by joining the parts of the different roots together, not conſidering that the dividing a root in that manner was robbing it of life; but we ſhall paſs over theſe uſeleſs chimeras, and ſhew two very eaſy and ſimple methods of producing this marvellous alteration: the firſt is to ſet the bulbs of the breeders in a very poor ſoil; and this practice is built on a well-grounded hypotheſis, which has ever prevailed, and is ſtill maintained, that the breaking of flowers is occaſioned by the weakening of their natural ſtrength, and no cauſe is better adapted to produce this effect than the defect of nutriment. The ſecond method is to make as great a change as poſſible in the ſoil the bulbs are to be ſet in, either by taking them out of one garden and planting them in another, or by mixing different kinds of earth, or by procuring new ſorts every year from Holland; as we have often experienced ſo great a change of air and ſoil cauſes a great variety of colours: but we do not poſitively aſſert that theſe methods will always ſucceed, becauſe nature will not at all times ſecond our endeavours; it is, however, moſt certain, that there are no better methods known than thoſe above mentioned.

The variegated late blowers are the laſt ſort of tulips that deſerve notice; theſe are, beyond diſpute, the moſt diverſified, beautiful and perfect, of all: there is an almoſt infinite number of varieties; all ariſing originally from one diſtinct ſpecies, which are reduced by floriſts into five claſſes: 1. Tulips with a white bottom, ſtriped with brown, called baguette primo. 2. Such as have a white bottom ſtriped with brown, called baguette rigaut. 3. Thoſe with a white bottom, ſtriped with violet and blackiſh brown, called bibloemen. 4. Thoſe with a white bottom, ſtriped with roſe-colour, vermillion, and ruby. 5. Such as have a yellow bottom, ſtriped with different colours, called bizarres.

The properties required in a fine tulip, are, 1. That it ſhould have a tall ſtem, riſing to the height of three or four feet, becauſe this is agreeable to the nature of the tulip; all floriſts, indeed, do not concur in this opinion, for in ſome places the height of the tulip is not regarded, whereas in England, Holland, and Flanders, a tulip with a ſhort ſtem is but little eſteemed.

2. That the corolla be large, well proportioned, and compoſed of ſix petals, three within and three without; theſe ſhould not be too long nor pointed, becauſe that would ſpoil their ſymmetry, which frequently occurs in old tulips, and ſometimes in modern ones; theſe petals when opened ſhould neither turn inward nor bend outward, for if they turn in, much of their beauty is diminiſhed, yet there are many fine tulips which labour under this defect; the petals ought alſo to be round at their extremities, broad, and thick, for when they are thin they crumple, and the colours are apt to be blended.

3. The colours ought to be lively and bright; thoſe that are moſt valued and held in greateſt eſteem, are, the black, golden-yellow, purple-violet, roſe, and vermillion colours. Tulips whoſe flowers are finely ſtriped, and variegated with three colours, diſtinct and unmixed, with very ſtrong and regular ſtreaks, without any tinge of the colour of the breeders, are the fineſt bizarres, and may be called perfect tulips.

It would alſo be a perfection in tulips if the colours always came out the ſame, but this is not the caſe, it happening ſometimes that a flower of very great price degenerates and becomes of no value, and there is no known method to prevent this metamorphoſis, for which nature alone is anſwerable. All tulips are not equally liable to this alteration of colour, ſome being leſs ſuſceptible of it than others, as the baguette primo, and the baguette rigaut, which are the leaſt ſubject to it of any: thoſe that have a white bottom with a very fine ſhade, as alſo the bizarres, whoſe fine diverſified colours form a kind of beard at the extremities of the petals, are not very changeable; but the true bizarres, that are painted with a mixture of ſeveral colours, and tinged with that of the breeder, have their beauty ſoon obliterated by a ſudden change.

Tulips are increaſed either from off-ſets or ſeeds; the ſeaſon for planting the off-ſets and blowing-roots is in October or November; they may alſo be planted in January or February, where the ſoil is very moiſt.

The moſt curious in flowers ſet them in beds at ſix, ſeven, or eight inches aſunder, according to the ſorts, and at the depth of ſix or ſeven inches: when they begin to appear above ground, in the ſpring, bad weather and froſts may much injure the tender leaves, and thereby do great damage to the flowers; therefore, at thoſe times they ſhould be carefully ſheltered with mats, &c. for if this be neglected, the ſtems and leaves will ſuffer by it; nor will the miſchief end there, but will be extended both to the flowers, which will be leſs beautiful, and alſo to the roots, which will be weakened and very much affected by the loſs of the leaves.

When the ſtems grow up, and the flowers begin to colour, they ought to be ſupported, otherwiſe the wind would break them down; for this purpoſe, ſticks ſhould be prepared of a proportional length and thickneſs, to which the ſtems ſhould be faſtened.

The tulips, when in bloom, ſhould be ſhaded from the violence of the meridian ſun, otherwiſe they will be but of ſhort duration.

The time for taking up the roots is uſually in June, when the leaves are withered; they ſhould then be laid in an airy place, but not expoſed to the ſun; and three or four weeks afterward, when they are well dried, they ſhould be freed from their outward ſkins, and then laid in the ſame place, where they may remain until the time of planting.

There are few but the Hollanders who have the patience to raiſe tulips from ſeeds, as we muſt wait eight or ten years before we can ſee a tulip in flower, that has been produced from ſeed, and after all it is but a whole-blower. Such, however, as like to ſow, may chuſe ſuch ſorts of tulips as pleaſe them beſt; the moſt curious, indeed, are for the breeders, but we leave every one to his own choice.

When the floriſt has fixed upon the flowers he would ſave ſeed from, he muſt let them have the benefit of the ſun and air, otherwiſe the ſeeds will not come to perfection; they muſt be ſuffered to ſtand in the ground till the ſeed-veſſels begin to open and ſhew the ſeeds of a brown colour; they muſt then be cut and laid in a dry place, letting the ſeeds remain in their capſules till the month of September: the ſeeds are then to be ſown at the depth of an inch, in pots filled with well prepared earth, which muſt be placed in the ſhade till November, when they may be expoſed to the ſun. In the ſpring they are to be ſet again in the ſhade, and afterwards watered while the leaves are green; but when the leaves are withered, the roots are to be taken out of theſe pots and put into others, which are to be expoſed to the ſun in the ſame manner as the former year: after two years,

the bulbs are to be taken out of these second pots, and treated like other tulips.

Tulip-Tree, *Liriodendrum*, in botany, a plant which grows naturally in many parts of North America, where it arrives to a tree of the first magnitude; the young branches are covered with a smooth purplish bark, and furnished with large leaves, whose footstalks are four inches long and ranged alternately; the leaves are of a singular form, being divided into three lobes, the middle one is blunt and hollowed, appearing as if a piece was cut out; the two side lobes are rounded, and end in blunt points; the upper surface of the leaves is smooth and of a lucid green, and the under is of a pale green; the flowers are produced at the extremities of the branches, they are each composed of six petals, three without and three within, forming a sort of bell-shaped flower, much resembling the tulip (whence the name); these petals are marked with green, yellow, and red spots, making a fine appearance when the tree is full of flowers; the stamina consists of many filaments, with linear antheræ fastened to their sides; the germina are numerous, and when the petals drop, they swell and form a kind of cone, consisting of many imbricated compressed seeds: the flowers come out in July.

This tree is propagated from seeds sown in the spring on a hot bed, and afterwards hardened by degrees to the sun and air.

Chequered Tulip, *Fritillaria*, in botany, a genus of plants, whose flower is hexapetalous and campanulated, with a nectarium placed in the base of each petal; the stamina are six subulated filaments, terminated with oblong, erect, quadrangular antheræ; the fruit is an oblong, obtuse, trilocular capsule, with three cells, containing many flat seeds ranged in a double order.

To this genus Linnæus has added the corona imperialis of Tournefort.

TUMEFACTION, the act of swelling or rising into a tumour.

TUMOUR, or Tumor, in medicine and surgery, a preternatural rising or enlargement on any part of the body. Tumour is also defined, by physicians, a solution of continuity arising from some humour collected in a certain part of the body, which disjoins the continuous parts, insinuates itself between them, and destroys their proper form.

Whether there be any such preternatural rising or enlargement on any part of the body, may be discovered from inspection, but more particularly by feeling. And, notwithstanding, it is a general custom to refer excrescences, as warts, corns, and such as grow in the nose and pudenda, to the class of tumours; yet, because they grow not from beneath, but out of, or upon, the skin itself, it is thought proper not to comprehend them in the general division of tumours.

There are tumours of various kinds, distinguished by particular names, according to the different causes from whence they proceed, and the particular parts wherein they are seated; some are called hot, others cold and watry; some are termed windy, others schirrous; and some are named benign, others malignant; but Heister finds fault with these distinctions. There are some tumours which are the same with inflammations, are generally termed phlegmons when violent and seated in the common integuments; but when slighter, they are commonly called furuncles. The inflammation which is not fixed deep, but spreads only superficially upon the skin, is termed an erysipelas: the inflammatory tumour that arises at the finger-ends is termed paronychia: that which fixes in the groin or armpits is called a bubo; and that under the ears a parotis. When an inflammation seizes the hands and feet from extreme cold, chilblains arise; which tumour is called pernio.

Encysted Tumours, tumours arising in different parts of the body, but contained in certain membranous coats: these are sometimes harder, sometimes softer, of a palish colour, and usually attended with little pain. These tumours arise from obstructions either in the glands, or in the adipose membrane, more especially about the face and neck, where they occasion great deformity. The membranous coat with which these tumours are invested, is often of a considerable thickness, and is usually the coat of the disordered gland, or some of the adipose cells. At their beginning they are usually very small and moveable; but encreasing by slow degrees, they grow sometimes to an enormous bulk.

The consistence of some of these tumours is soft and fluctuating, and of others more hard and firm. They are of all shapes and sizes, and some of them become hard as a callus, and unmoveable, while others are for the generality, soft and moveable.

They are distinguished according to the consistence of their contents; some are called atheromata, from their contents resembling paste; others, which have them of the consistence of honey, are called meliceres; but if they are of a fatty substance, like suet or lard, they are called steotomata. If they happen in a gland which becomes indurated, they are called schirrous: and lastly, when they are of a fleshy consistence, they are called sarcomata. Some of these tumours have been found also full of hair.

They are distinguished by others according to the places where they are situated. Those seated under the scalp are called talpa, testudo, or lupia. Those in the neck, strumæ or scrophulæ; and those in the hands and feet, especially if among the tendons, are called ganglions.

There is no general method for the cure of them; but the surgeon, according to their different circumstances, attempts this by discussion, suppuration, or extirpation.

But if the tumour can neither be dispersed nor suppurated, but continues to enlarge itself, it is adviseable to extirpate it, in order to prevent its turning into a cancerous nature. There are several methods in practice for extirpating these tumours according to their nature and size: those which are small and hard, or hung by a root as by a stalk, are generally best removed by ligature, in the manner of warts; by which means they wither and fall of themselves in a few days. But the most ready and expeditious method is to cut them off with a scalpel, and then heal up the wound: but if in removing them this way you divide a considerable artery, you may stop it by some potential, or even the actual cautery; or else, by taking it up with a needle and thread. Lastly, these tumours may be often removed by the application of caustick or corroding medicines, retained about the root by means of plasters, compresses, and a bandage; and when you find the root of the tumour almost corroded through, the rest may be divided by the scalpel. See Caustick.

If the root of the encysted tumour appears too large for it to be conveniently taken off by ligature, you must then remove it either by the knife or by the causticks, though the latter is generally preferred. In order to extirpate it by the knife, you must first make a longitudinal incision upon the tumour; and if it does not appear sufficient, make another incision across the former, till you think the wound large enough for taking out the tumour; in order to which you next dilate the integuments, and separate them from the cyst of the tumour, which you are to take out whole, if possible, either by means of the scalpel, a hook, or by passing a crooked needle, with a strong thread, crosswise under the tumour; but great caution is necessary in this operation, lest any important part that is contiguous to the tumour be injured.

The tumour being thus carefully extracted, if the wound and hæmorrhage be small you may press the lips together; and by covering the same with lint and compresses, retained with a proper bandage, the patient is cured in a few days time; but in case of a profuse hæmorrhage, the blood is to be stopped either by ligature, astringents, or the actual or potential cautery.

TUN, or Ton, originally signifies a large vessel or cask of an oblong form, biggest in the middle, and diminishing towards its two ends, girt about with hoops, and used for stowing several kinds of merchandize, for convenience of carriage; as brandy, oil, sugar, skins, hats, &c.

This word is also used for certain vessels of extraordinary bigness, serving to keep wine in for several years.

Tun is also a certain measure for liquids; as wine, oil, &c. See Measure.

Tun is also a certain weight whereby the burden of ships, &c. are estimated.

TUNE, or Tone, in musick, that property of sounds whereby they come under the relation of acute and grave to one another.

Though gravity and acuteness are mere terms of relation, the tune of the sound is something absolute, every

ſound having its own proper tone, which muſt be under ſome determinate meaſure in the nature of the thing.

The only difference then between one tune and another is in the degrees.

If two or more ſounds be compared together in this relation, they are either equal or unequal in the degree of tune. Such as are equal are called uniſons.

The unequal conſtitute what we call an interval, which is the difference of time between two ſounds.

Sonorous bodies we find differ in tune: 1. According to the different kinds of matter; thus a wedge of ſilver ſounds much more acute than a wedge of gold of the ſame ſhape and dimenſions; in which caſe the tones are proportional to the ſpecifick gravity. 2. According to the different quantities of the ſame matter in bodies of the ſame figure, a ſolid ſphere of braſs, one foot diameter, ſounds acuter than one of two feet diameter; in which caſe the tunes are proportional to the quantity of matter. Here then are different tunes connected with different ſpecifick gravities and quantities of matter, as their immediate cauſe. In effect, the meaſures of tune are only ſought in the relations of the motions that are the cauſe of ſound, which are no way ſo diſcernable as in vibrations of chords.

In the general we find that, in two chords, all things being equal, except tenſion, or thickneſs, or length, the tunes are different; there muſt, therefore, be a difference in the vibrations owing to theſe different tenſions, &c. which difference can only be in the velocity of the courſes and recourſes of the chords, through the ſpaces wherein they move to and again. Now, upon examining the proportion of the velocity and the things juſt mentioned, wherein it depends, it is found, to a demonſtration, that all the vibrations of the ſame chord are performed in equal times. Hence, as the tone of a ſound depends on the nature of thoſe vibrations, whoſe difference we can conceive no otherwiſe than as having different velocities; and as the ſmall vibrations of the ſame chord are performed in equal times, and it is found true, in fact, that the ſound of any body, ariſing from any individual ſtroke, though it grows gradually weaker, yet continues the ſame tone from firſt to laſt: it follows, that the tone is neceſſarily connected with a certain quantity of time, in making every ſingle vibration; or, that a certain number of vibrations, accompliſhed in a given time conſtitutes a certain determinate tune; for the more frequent thoſe vibrations are, the more acute the tone; and, the ſlower and fewer they are, the more grave the ſound, though performed in the ſame ſpace of time; ſo that any given note of a tune is made by one certain meaſure of velocity of vibrations, i. e. ſuch certain courſes and recourſes of a chord or ſtring, in ſuch a certain ſpace of time, conſtitute a determinate tune.

This theory is ſtrongly ſupported by our beſt and lateſt writers on muſick, Dr. Holder, Mr. Malcolm, &c. both from reaſon and experience. Dr. Wallis, who holds it very reaſonable, adds, that it is evident the degrees of acuteneſs are reciprocally as the lengths of the chords, though, he ſays, he will not poſitively affirm that the degrees of acuteneſs anſwer the number of vibrations as their true cauſe: but this difference ariſes hence, that he doubts whether the thing has been ſufficiently proved by experiment. Indeed, whether the different numbers of vibrations, in a given time, is the true cauſe on the part of the object of our perceiving a difference of tune, is a thing which, we conceive, does not come within the reach of experiment. It is enough that the hypotheſis is reaſonable.

TUNICA, *Tunic*, in anatomy, is applied to the membranes which inveſt the veſſels, and divers others of the leſs ſolid parts of the body; thus the inteſtines are formed of five tunicks, or coats.

There are alſo five tunicks, or coats, of the eye, for which ſee the article EYE.

TUNNAGE is uſed for a cuſtom or impoſt, payable to the crown, for goods and merchandize imported or exported, and is to be paid after a certain rate for every tun thereof. This duty as well as that of poundage, was firſt granted for life to king Charles II. and has been continued in the ſame manner to his royal ſucceſſors, down to his preſent majeſty George III.

TUNNEL-NET, a net for taking partridges, which ſhould not exceed 15 feet in length, nor be leſs than 18 inches in breadth, or opening for the entrance.

TUNNING *of Ale or Beer*, a part of the proceſs of brewing, or rather an operation which is the ſequel of it. When the beer has worked or fermented in an open vat, as long as is proper, tun it up into ſeaſoned veſſels, that is, ſuch as have had ale or beer in them before; for if it be put into new caſks, it muſt be made ſtronger than ordinary, elſe it will not keep ſo long, becauſe the caſk will imbibe the ſpirits, and the reſt will ſoon become flat and vapid. It is beſt to tun beer juſt when it comes to a due fermentation, and gets a good head; for then it has the moſt ſtrength to clear itſelf in the caſk, and what works over may be put into the ſmall beer, and muſt be ſupplied with freſh beer of the ſame brewing. When the beer is tunned, carry it while it works in the caſk, into a good cellar, or proper place to preſerve it; for if it be ſtirred after it has done working, it will be apt to grow ſtale, ſour, and become alegar.

TURBARY, denotes a right to dig turfs on another's ground; and it is likewiſe taken for the ground or place where turfs are digged, ſometimes called the turfary.

TURBINATED, is a term applied by naturaliſts to ſhells which are ſpiral, or wreathed, conically, from a larger baſis to a kind of apex.

TURBITH, or TURPETH-ROOT, in the materia medica, the cortical part of the root of an Indian convulvulus, brought to us in oblong pieces, of a brown or aſh-colour on the outſide, and whitiſh within: the beſt is pondorous, not wrinkled, eaſy to break, and diſcovering a large quantity of reſinous matter to the eye: its taſte is at firſt ſweetiſh; when chewed for a little time, it becomes acid, pungent, and nauſeous. This root is a cathartick, not of the ſafeſt, or moſt certain kind.

TURBITH MINERAL, a name given by chymiſts to a yellow precipitate of mercury, prepared after the following manner. Upon purified quickſilver, contained in a glaſs veſſel, pour double its weight of the ſtrong ſpirit or oil of vitriol. Heat the liquor by degrees, ſo as at length to make it boil, till a white maſs remains, which is to be thoroughly dried, with a ſtrong fire. This maſs, on the effuſion of warm water, grows yellowiſh, and falls into powder; which is to be carefully ground with the water in a glaſs mortar: then ſuffer it to ſettle, pour off the water, and waſh the powder in ſeveral parcels of freſh water, until it is ſufficiently dulcified.

This preparation is a ſtrong emetick, and operates the moſt powerfully of all the mercurials that can be ſafely given internally. Its action, however, is not confined to the primæ viæ; it will ſometimes excite a ptyaliſm, if a purgative is not ſoon taken after it. It is chiefly uſed in violent gonorrhæas, and other venereal caſes, where there is a great flux of humours to the parts: the doſe is from two grains to ſix or eight; though there are ſome conſtitutions, that have been uſed to mercurials, that bear well even the doſe of a ſcruple. This medicine has alſo of late been recommended as the moſt effectual preſervative againſt the hydrophobia.

The waſhings of turbith mineral are by ſome externally applied for the itch, and other cutaneous foulneſſes; but in theſe caſes, though it often does ſervice, the patient muſt not be too free with it.

TURBOT, or TURBUT, in ichthyology, the Engliſh name of a ſpecies of pleuronectes, with the eyes on the right ſide, and the body ſmooth. It grows to a conſiderable ſize, and is one of the moſt eſteemed fiſh at table.

TURCICA TERRA, Turkey earth, in the materia medica, a very fine bole or medicinal earth, dug in great plenty in the neighbourhood of Adrianople, and uſed by the Turks as a ſudorifick and aſtringent; and famous among them in peſtilential diſeaſes.

TURCOISE, or TURQUOISE, *Turcheſia*, in natural hiſtory, an ore of copper, erroneouſly ranked among gems. There are, indeed, two kinds of turquoiſe; the one a true and genuine ore of copper; the other the bones of animals, tinged to a beautiful blue colour by having been buried in places where copper-ore has been near them.

TURF, a blackiſh ſulphureous earth, uſed in ſeveral parts of England, Holland, and Flanders, as fuel.

In the north of England, Scotland, &c. turf is dug out of ſoft, moiſt, rotten earth, called peatmoſs. They dig horizontally from the ſurface, to the depth of about four

four feet, with a ſpade, which at once faſhions and takes them out in parallelopipeds nine or ten inches long, and three ſquare, which are ſpread on the ground to drain as faſt as dug; and then ſet up an end three or four againſt each other, for the wind to blow through them; and at laſt they are ſtacked or houſed. The pits or dykes, in a few years, fill up again and afford a freſh crop.

TURFING-SPADE, an inſtrument uſed to undercut the turf, after it is marked out with the plough.

TURGESCENCE, or TURGESCENCY, among phyſicians, denotes a ſwelling, or growing bloated.

TURIONES, among herbaliſts, denotes the firſt young tender ſhoots, which plants annually put forth.

TURKEY, the name of a well known fowl, reared in many parts of England.

Moſt of our houſewifes, ſays a Swediſh author on huſbandry, have long deſpaired of ſucceſs in rearing turkeys, and complained that the profit rarely indemnifies them for their trouble and loſs of time; whereas, continues he, little more is to be done than to plunge the chick into a veſſel of cold water, the very hour, or if that cannot be, the day it is hatched, forcing it to ſwallow one whole pepper-corn, and then reſtoring it to its mother. From that time it will become hardy, and fear the cold no more than a hen's chick. After which it muſt be remembered that theſe uſeful creatures are ſubject to one particular malady whilſt they are young, which carries them off in a few days. When they begin to droop, examine carefully the feathers on their rump, and you will find two or three, whoſe quill part is filled with blood: upon drawing theſe the chick recovers, and after that requires no other care than what is commonly beſtowed on poultry that range the court-yard.

Theſe articles are too true to be denied; and in proof of the ſucceſs, three pariſhes in Sweden have, for many years, gained ſeveral hundred pounds by rearing and ſelling turkies.

TURMERICK, in the materia medica, the root of a plant, called by botaniſts curcuma. It is brought from the E. Indies, where they uſe it in ſauces and foods.

As a medicine it is eſteemed aperient and emenagogue, and of ſingular efficacy in the jaundice. But beſides theſe uſes, glovers uſe it for dying their leather; and the turners, to give an agreeable yellow to ſeveral of their works made in the whiter woods.

TURN, in law, a court held twice a year, viz. within a month after Eaſter and Michaelmas, reſpectively, by the ſheriff of every county.

TURNADO, or TORNADO, a wind which on ſome coaſts blows all night from the ſhore.

TURNAMENT, or TOURNAMENT, a martial ſport, or exerciſe, which the ancient cavaliers uſed to perform to ſhew their bravery and addreſs.

TURNEP, or TURNIP, an eſculent plant, of which there are three ſpecies enumerated by Miller. The firſt is the turnip which is commonly cultivated in the fields, of which there are the following varieties, viz. the round red or purple topped turnip, the green topped turnip, the yellow turnip, the black rooted turnip, and the early Dutch turnip. The laſt ſort is commonly ſown early in the ſpring, to ſupply the markets in May and June, but never cultivated for a general crop. The red-rooted turnip was formerly more cultivated in England than at preſent; for ſince the large green topped turnip has been introduced, all the ſkilful farmers prefer it to the other ſorts; the roots of the green will grow to a large ſize, and continue good much longer than the other ſorts. The next to this is the red or purple topped turnip, which will alſo grow large, and is extremely good for ſome time; but the roots of this will become ſtringy much ſooner than thoſe of the green topped. The long rooted turnip, the yellow turnip, and the blackiſh rooted turnip, are now rarely cultivated in England, neither of them being ſo good for the table or for feed, as the red and green topped turnip, though there are ſome few perſons who ſow them for the ſake of variety.

"The French turnip is not much cultivated in England, but in France and Holland they are in great eſteem, eſpecially for ſoups; their roots being ſmall, are boiled whole in the ſoup, and ſo ſerved up to the table; theſe muſt be uſed while they are young, otherwiſe they will become rank and ſtringy.

"Theſe are ſuppoſed to be only varieties which have accidentally been obtained from ſeeds, therefore I have not enumerated them as diſtinct ſpecies; but yet I am certain they are conſtant, where care is taken in the ſaving of their ſeeds not to ſuffer any mixture to ſtand for ſeeds: I have ſown of three or four ſorts ſeveral years, and have always found them retain their differences; however, it is not eaſy to determine if ſome of theſe were not by culture firſt obtained from ſeeds of the common white turnip. The yellow turnip ſeems moſt unlikely to have been an accidental variety, for I have never known this alter, and the roots are yellow within, whereas all the other have white fleſh, notwithſtanding their outſides are of very different colours.

"The long rooted turnip is, I think, a diſtinct ſpecies, the form of the root, and its manner of growth being totally different from the other ſorts. I have ſeen theſe roots as long as thoſe of the parſnip, and nearly of the ſame ſhape; theſe run deep into the ground, therefore unfit for feeding of cattle; and unleſs they are uſed very young, become ſtrong, and not proper for the table, which has occaſioned their being rejected of late years.

"The green topped turnip grows above ground more than any of the other, which renders it preferable for feeding of cattle; and being the ſofteſt and ſweeteſt root when grown large, of any of the kinds, is moſt eſteemed for the table; but in very ſevere winters they are in greater danger of ſuffering by froſt, than thoſe whoſe roots lie more in the ground, eſpecially if they are not covered by ſnow; for when they are frequently hard frozen and thawed, it cauſes them to rot ſooner than thoſe whoſe fleſh is leſs tender and ſweet. I have ſeen the roots of this ſort, which were more than a foot diameter, boiled, and were as ſweet and tender as any of the ſmalleſt roots.

"Turnips delight in a light, ſandy, loamy ſoil, which muſt not be rich; for in a rich ſoil they grow rank and are ſticky, but if it be moiſt they will thrive the better in ſummer, eſpecially in freſh land, where they are always ſweeter than upon an old worn-out or a rich ſoil.

"The common ſeaſon for ſowing of turnips, is any time from the beginning of June to the middle of Auguſt, or a little later; though it is not adviſeable to ſow them much after, becauſe if the autumn ſhould not prove very mild, they will not have time to apple before winter, nor will the roots of thoſe which are ſown after the middle of July, grow very large, unleſs the froſts keep off long in autumn. But, notwithſtanding this is the general ſeaſon in which the greateſt part of turnips are ſown in the country, yet, about London, they are ſown ſucceſſively from March to Auguſt, by thoſe who propagate them to ſupply the markets with their roots; but there is a great hazard of loſing thoſe which are ſown early in the year, if the ſeaſon ſhould prove dry, by the fly, which will devour whole fields of this plant while young; ſo that where a ſmall quantity for the ſupply of a family is wanted, it will be abſolutely neceſſary to water them in dry weather; and where a perſon ſows thoſe ſeeds in April and May, it ſhould always be upon a moiſt ſoil, otherwiſe they ſeldom prove good; the heat of the weather at that ſeaſon being too great for them upon a dry ſoil; but thoſe which are ſown towards the middle or latter end of June, commonly receive ſome refreſhing ſhowers to bring them forward; without which, it is very common to have them all deſtroyed.

"Theſe ſeeds ſhould always be ſown upon an open ſpot of ground; for if they are near hedges, walls, buildings, or trees, they will draw up, and be very long topped, but their roots will not grow to any ſize.

"They are ſown in great plenty in the fields near London, not only for the uſe of the kitchen, but for food for cattle in winter, when there is a ſcarcity of other food; and this way is become a great improvement to barren ſandy lands, particularly in Norfolk, where, by the culture of turnips, many perſons have doubled the yearly value of their ground.

"The land upon which this feed is ſown, ſhould be ploughed in April, and twice-fallowed in May; that is, once more ploughed and twice well harrowed, and made very fine; then the feed ſhould be ſown pretty thin; for it being ſmall, a little will ſow a large piece of ground; one pound is the common allowance for an acre of land. The ſeed muſt be harrowed in as ſoon as it is ſown, with a ſhort-tined harrow, and the ground rolled with a wooden roll, to break the clods, and make the ſurface even. In ten

ten days or a fortnight after ſowing, the plants will come up; at which time, if the ſeaſon ſhould prove dry, they will be in great danger of being deſtroyed by the fly; but if it ſo happen, the ground muſt be ſowed again, for the ſeed being cheap, the chief expence is the labour; but the ground ſhould be firſt harrowed to looſen it, eſpecially if it is ſtiff land.

" When the plants have got four or five leaves, they ſhould be hoed to deſtroy the weeds, and to cut up the plants where they are too thick, leaving the remaining ones about ſix or eight inches aſunder each way, which will be room enough for the plants to ſtand for the firſt hoeing; the ſooner this is performed, when the plants have four leaves, the better they will thrive; but in the ſecond hoeing, which muſt be performed about a month after the firſt, they ſhould be cut up, ſo as that the remaining plants may ſtand 14 or 16 inches diſtance, or more, eſpecially if they are deſigned for feeding of cattle; for where the plants are allowed a good diſtance, the roots will be proportionably large; ſo that what is loſt in number, will be over-gained by their bulk, which is what I have often obſerved. But in ſuch places where they are ſown for the uſe of the kitchen, they need not be left at a greater diſtance than 10 inches or a foot, becauſe large roots are not ſo generally eſteemed for the table.

" It is not many years ſince the practice of ſowing turnips for feeding of cattle has been of general uſe; how it happened that this improvement ſhould have been ſo long neglected in every part of Europe, is not eaſy to determine, ſince it is very plain, that this piece of huſbandry was known to the ancients. For Columella, in treating of the ſeveral kinds of vegetables which are proper for the field, recommends the cultivating rape in plenty; becauſe, ſays he, thoſe roots which are not wanted for the table, will be eaten by the cattle: yet this plant was not much cultivated in the fields till within the laſt 60 or 70 years; nor is the true method of cultivating turnips yet known, or at leaſt not practiſed, in ſome of the diſtant counties of England, at this time. For in many places the ſeed is ſown with barley in the ſpring, and thoſe plants which come up, and live till the barley is cut, produce a little green for the ſheep to pick up, but never have any roots. In other places, where the turnip ſeed is ſown by itſelf, the method of hoeing them is not underſtood; ſo that weeds and turnips are permitted to grow together; and where the turnips come up thick in patches, they are never thinned, ſo that they draw up to have long leaves, but never can have good roots, which is the principal part of the plant, therefore ſhould be chiefly attended to.

" The general method now practiſed in England, for cultivating this plant in the fields, is the ſame as is practiſed by the farming gardeners, who ſupply the London markets with theſe roots, and is the ſame as before directed. But it is only within the compaſs of a few years, that the country people have been acquainted with the method of hoeing them; ſo that the farmers formerly employed gardeners, who had been bred up in the kitchen gardens, to perform this work; but it is now performed by many country labourers, by which means that practice is loſt to the kitchen gardeners; the labourers doing it much cheaper.

" There has alſo been another method practiſed very lately, by ſome very curious farmers, in cultivating of turnips, which is by ſowing the ſeeds in rows, with the drill-plough. In ſome places the rows are ſown three feet aſunder, in others four, in ſome five, and ſome ſix. The latter has been recommended by ſome, as the moſt proper diſtance; and although the intervals are ſo large, yet the crop produced on an acre has been much greater than upon the ſame quantity of land, where the rows have been but half this diſtance; and upon all the fields which have been tilled, the crops have greatly exceeded thoſe which have been hand-hoed. The late lord viſcount Townſhend was at the expence of making the trial of theſe two different methods of huſbandry, with the greateſt care, by equally dividing the ſame fields into different lands, which were alternately ſown in drills, and the intermediate lands in broad-caſt. The latter were hoed by hand, in the common method, and the other cultivated by the hoeing-plough; and when the roots were fully grown, his lordſhip had an equal quantity of land, which had been ſowed in the different methods, meaſured, and the roots drawn up and weighed; thoſe roots which had been cultivated by the plough, were ſo much larger than the other, that the crop of one acre weighed a ton and an half more than that of an acre in the other huſbandry.

" But when the turnips are ſown in drills, they will require to be hoed by hand, to ſeparate and cut out the plants, where they are too near together in the rows; as alſo to cut up the weeds between the plants, where the plough cannot reach them. If this is carefully performed, the ploughing of the intervals will encourage the growth of the roots, by thus ſtirring of the ground, and make it much better prepared for the crop of barley, or whatever elſe is ſown in the following ſpring. This method of culture may be ſuppoſed to be more expenſive than that commonly practiſed, by thoſe unacquainted with it; but thoſe who have made trial of both, find the horſe-hoeing to be much the cheapeſt, and by far the beſt. For the country people, who are employed in hand-hoeing of turnips, are very apt to hurry over their work, ſo that half the weeds are left growing, and the plants are ſeldom ſingled out ſo well as they ſhould be; nor are they curious enough to diſtinguiſh the charlock, which is one of the moſt common weeds in arable land, from the turnips; ſo that about the middle of September, it is very common to ſee the fields of turnips full of the yellow flowers of the charlock. Now, in the horſe-hoeing, all the weeds in the intervals will be entirely deſtroyed; ſo that if a few plants of the rows of turnips ſhould be overlooked, they may be eaſily drawn when they appear viſible, and by this method the land will be ſooner and better cleared from weeds.

" The greateſt evil which attends a crop of turnips, is that of their being deſtroyed by the fly, which uſually happens ſoon after the plants come above-ground, or while they are in the ſeed leaf; for, after they have put out their rough leaves pretty ſtrong, they will be paſt this danger. This always happens in dry weather; ſo that, if there ſhould be rain when the turnips come up, they will grow ſo faſt, as to be in a few days out of danger from the fly; and it hath been found, that thoſe, which have been ſown in drills, have eſcaped the fly much better than thoſe ſown in broad caſt; but, if ſoot is ſown along the ſurface of each drill, it will be of great ſervice to keep off the fly, and a ſmall quantity of it will be ſufficient for a large field, where the drills only are to be covered.

" Another danger of the crops being deſtroyed is from the caterpillars, which very often attack them, when they are grown ſo large as to have ſix or eight leaves on a plant. The ſureſt method of deſtroying theſe inſects, is to turn a large parcel of poultry, which ſhould be kept hungry, early in the morning into the field; theſe fowls will ſoon devour the inſects, and clear the turnips. To this evil the turnips, which are ſown in drills, are not ſo much expoſed; for as the ground between the rows will be kept ſtirred, the plants will be kept growing, ſo will not be in danger of ſuffering from theſe inſects, for the parent inſects never depoſit their eggs upon any plants which are in health; but as ſoon as they are ſtinted, they are immediately covered with the eggs of theſe inſects; and this holds in general with vegetables as with animals, who are ſeldom attacked by vermin when they are in perfect health; whereas, when they become unhealthy, they are ſoon overſpread with them; ſo that it is the diſeaſe which occaſions the vermin, and not the vermin the diſeaſe, as is commonly imagined.

" When the turnips are ſown in drills, it will be the beſt way to plough between every other row at firſt, and ſome time after to plough the alternate intervals, by which method the plants will receive more benefit from the often ſtirring the ground than they would do, if all the intervals were hoed at one time; and plants will be in leſs danger of ſuffering from the earth being thrown up too high on ſome rows, while others may be left too bare of earth; but, when the earth has been thrown up on one ſide of the drill, it may be turned down again ſoon after the next interval is ploughed. This alternate moving of the earth will prepare the ground very well for the ſucceeding crop, and greatly improve the turnips; but, as the plough cannot well be drawn nearer to the drills than two or three inches, the remaining ground ſhould be forked to looſen the parts, and make way for the

the fibres of the roots to ſtrike out into the intervals; otherwiſe, if the land is ſtrong, it will become ſo hard in thoſe places which are not ſtirred, as to ſtint the growth of the turnips. This may be done at a ſmall expence; a good hand will perform a great deal of this work in a day, and, whoever will make the trial, will find their accounts in practiſing it, eſpecially on all ſtrong land, where the turnips are much more liable to ſuffer from the binding of the ground, than they will be on a looſe ſoil; but yet, in all ſorts of ground, it will be of great ſervice to practiſe this.

" When the ground is thus ſtirred in every part, one ploughing will be ſufficient, after the turnips are eaten, for the ſowing of barley, or any other crop; ſo that there will be an advantage in this, when the turnips are kept late on the ground, as will often be the caſe, eſpecially when they are cultivated for feeding of ewes, becauſe it is often the middle of April before the ground will be cleared: for late feed in the ſpring, before the natural graſs comes up, is the moſt wanted, where numbers of ſheep or ewes are maintained, and one acre of turnips will afford more feed than 50 acres of the beſt paſture at that ſeaſon.

" In Norfolk and ſome other counties they cultivate great quantities of turnips for feeding of black cattle, which turn to great advantage to their farms, for hereby they procure a good dreſſing for their land; ſo that they have extraordinary good crops of barley upon thoſe lands, which would not have been worth the ploughing, if it had not been thus huſbanded.

" When the turnips are fed off the ground, the cattle ſhould not be ſuffered to run over too much of the ground; for, if they are not confined by hurdles to as much as is ſufficient for them one day, the cattle will ſpoil three times the quantity of turnips they can eat, ſo that it is very bad huſbandry to give them too much room; therefore the hurdles ſhould be every day removed forward, and if the turnips are drawn out of the ground before the cattle or ſheep are turned into the new incloſure, there will be leſs waſte made, for they will then eat up the whole roots; whereas, if they are turned upon the turnips growing, they will ſcoop the roots, and leave the rinds, which being hollow, the urine of the ſheep will lodge in them; ſo that, when they are forked out of the ground, the ſheep will not eat any of thoſe roots which are thus tainted.

" I cannot omit taking notice of a common miſtake, which has generally prevailed with perſons who have not been well informed to the contrary, which is in relation to the mutton which is fatted with turnips, moſt people believing it to be rank and ill-taſted; whereas it is a known fact, that the beſt mutton this country affords is all fatted on turnips, and that rank mutton, whoſe fat is yellow, is what the low marſhy lands of Lincolnſhire, and other rank paſtures, produce.

" In order to ſave good turnip ſeeds, you ſhould tranſplant ſome of their faireſt roots in February, placing them at leaſt two feet aſunder each way, obſerving to keep the ground clear from weeds, until the turnips have ſpread ſo as to cover the ground, when they will prevent the weeds from growing. When the pods are formed, you ſhould carefully guard them againſt the birds, otherwiſe they will devour it, eſpecially when it is near ripe; at which time you ſhould either ſhoot the birds as they alight upon the ſeed, or lay ſome bird-limed twigs upon it, whereby ſome of them will be caught; and, if they are permitted to remain ſome time, and afterwards turned looſe, they will prevent the birds from coming thither again for ſome time, as I have experienced. When the ſeed is ripe it ſhould be cut up, and ſpread to dry in the ſun; after which it may be threſhed out and preſerved for uſe.

" There have been many receipts for preventing the fly taking turnips, but few of them deſerve notice; therefore I ſhall only mention two or three which I have ſeen tried with ſucceſs. The firſt was ſteeping the ſeeds in water with flour of brimſtone mixed, ſo as to make it ſtrong of the brimſtone: another was ſteeping it in water with a quantity of the juice of horſe-aloes mixed, both which have been found of uſe. The ſowing of ſoot or tobacco duſt over the young plants, as ſoon as they appear above ground, has alſo been found very ſerviceable: in ſhort, whatever will add vigour to the young plants, will prevent their being deſtroyed by the fly, for thoſe never attack them, till they are ſtinted in their growth." *Miller's Gard. Dict.*

TURNING, a branch of ſculpture, being the art of faſhioning hard bodies, as braſs, ivory, wood, &c. into a round or oval form, in a lathe. Turning is performed by putting the ſubſtance to be turned upon two points as an axis, and moving it round on that axis; while an edge-tool, ſet ſteady to the outſide of the ſubſtance in the circumvolution thereof, cuts off all the parts which lie farther off the axis, and makes the outſide of that ſubſtance concentrick to the axis. See LATHE.

TURNING-EVIL, in cattle, a diſeaſe that cauſes them frequently to turn round in the ſame place. It is alſo called the ſturdy.

The common remedy, recommended by Mr. Markham, is to throw the beaſt down, and bind him; then to open his ſkull, and take out a little bladder, filled with water and blood, which uſually lies near the membrane of the brain, and then gradually heal the wound.

TURNPIKE, a gate ſet up acroſs a road, watched by an officer for the purpoſe, in order to ſtop travellers, waggons, coaches, &c. to take toll of them, towards repairing or keeping the roads in repair.

In caſe any perſon ſhall drive horſes or other cattle through grounds adjoining to the highways, thereby to avoid the toll, they are liable to forfeit 10*s.* Or if any one aſſaults a collector of the tolls, or by force paſſes through a turnpike-gate without paying, he forfeits 5*s.* leviable by juſtices of peace; and maliciouſly pulling down a turnpike is deemed felony.

TURNPIKE, is alſo uſed, in the military art, for a beam ſtruck full of ſpikes, to be placed in a gap, a breach, or at the entrance of a camp, to keep off an enemy.

TURNSOLE, *Heliotropium*, in botany, which ſee.

TURPENTINE, a tranſparent ſort of reſin, flowing either naturally or by inciſion from ſeveral unctuous and reſinous trees, as the terebinthus, fir, pine, larch, &c.

We diſtinguiſh ſeveral kinds of turpentines; as that of Chio, of Venice, of Bourdeaux, of Cyprus, Straſburgh, &c.

The turpentine of Chio, or Scio, which is the only genuine kind, and that which gives the denomination to all the reſt, is a whitiſh reſin, bordering a little on green, very clear, and a little odoriferous; drawn by inciſion from a tree called terebinthus, very common in that iſland, as alſo in Cyprus, and ſome parts of France and Spain.

The reſin muſt be choſen of a ſolid conſiſtence, almoſt without either taſte or ſmell, and not at all tenacious, which diſtinguiſhes it from the falſe turpentine of Venice, commonly ſubſtituted for it, which has a briſker ſmell, a bitter taſte, and ſticks much to the fingers. This turpentine of Chio is indiſputably the beſt, but its ſcarcity occaſions it to be little in uſe.

The turpentine of Venice is falſly ſo called; for, though there was a turpentine anciently brought from Venice, yet that now ſo called comes from Dauphine. It is liquid, of the conſiſtence of a thick ſyrup, and whitiſh; and flows either ſpontaneouſly or by inciſion, from the larix, or larch-tree, chiefly in the wood de Pilatze.

That flowing naturally, called by the peaſants bijon, is a kind of balſam, not inferior in virtue to that of Peru, for which it is frequently ſubſtituted. That drawn by inciſion, after the tree has ceaſed to yield ſpontaneouſly, is of conſiderable uſe in ſeveral arts, and it is even of this that varniſh is chiefly made. It muſt be choſen white and tranſparent, and care be taken that it is not counterfeited with oil of turpentine.

The turpentine of Bourdeaux is white, and as thick as honey. It does not ooze from the tree in the manner it is ſent to us, but is properly a compoſition, wherein, among other ingredients, is a white hard ſort of reſin, called galipot. See PITCH.

The turpentine of Straſburgh, the produce of the abies, or ſilver fir, is that moſt commonly uſed among us, and is preferred by our people to that of Venice, which is diſtinguiſhed from it by its green hue, fragrant ſmell, and citron flavour.

The uſes of turpentine in medicine are innumerable. It is a great vulnerary, and very detergent, and as ſuch is preſcribed in abſceſſes, ulcerations, &c. It promotes expectoration, and as ſuch is preſcribed in diſeaſes of the lungs and breaſt; but it is moſt famous for clearing the

urinary

urinary passages, and as such prescribed in obstructions of the reins, in gonorrhœas, &c.

Oil of TURPENTINE. There are two kinds of oil drawn from turpentine, by distillation; the first white, the second red, both esteemed as balsams proper for the cure of wounds, chilblains, &c. But they are so little used among us, that it is not easy to procure either of them.

What is commonly sold under the name of oil of turpentine, or etherial oil, is only a distillation of the resinous juice of the tree, fresh as it is gathered. It is used with success in the cure of green wounds, as also by the painters, farriers, &c.

To be good, it must be clear and pellucid as water, of a strong penetrating smell, and very inflammable.

TURQUOISE, or TURCOISE. See TURCOISE.

TURRITIS, tower-mustard, in botany, a genus of plants, whose flower is tetrapetalous and cruciform, the petals are oblong, oval, obtuse, erect, and entire, with upright ungues: its stamina are awl-shaped and erect, and the fruit is a very long four-cornered pod, containing a great number of roundish emarginated seeds.

This genus grows wild on old walls, ruins, &c. in many parts of England.

TURUNDA, in medicine and surgery, denotes a tent, pellet, or pencil; or a piece of lint thrust into a wound, ulcer, &c. See TENT, &c.

TURTLE, in ichthyology, a name given to some species of the testudo, as the hawk's-bill turtle is the testudo with acuminated ungues, four on the hinder as well as the fore feet; the green turtle, or the testudo with two ungues on the fore feet, and one on the hinder; and the long-headed turtle, or the great oval-headed testudo.

TUSCAN ORDER (*plate* LXXVII. *fig.* 1.) is the most solid and simple of all the orders. It is composed of few parts, devoid of ornaments, and so massy, that it seems capable of supporting the heaviest burden. There are no remains of a regular Tuscan order among the antiques; the doctrine of Vitruvius concerning it is obscure; and the profiles of Palladio, Scammozzi, Serlio, de l'Orme, and Vignola, are all imperfect.

The height of the Tuscan column is 14 modules, or semidiameters, each consisting of 30 minutes; and that of the whole entablature three and a half modules; which being divided into 10 equal parts, three of them are for the height of the architrave, three for the freeze, and the remaining four for the cornice: the capital is one module; the base, including the lower cincture of the shaft, is likewise one module; and the shaft, with its upper cincture and astragal, 12 modules.

These are the general dimensions of the order; the particular dimensions may be learned by inspection of the plates.

In the remains of antiquity, the quantity of diminution at the top of the Tuscan column is various; but seldom less than one eighth, nor more than one sixth of the inferior diameter of the column. The last of these is generally preferred; and Chalmers and others make the same diminution in all columns, without regard to their order.

TUSCAN-EARTH, in the materia medica, a yellowish, white, pure bole, considerably heavy, of a very smooth surface, not easily breaking between the fingers, but adhering slightly to the tongue, and melting very readily in the mouth. It is dug in many parts of Italy, particularly about Florence, where there is a stratum of it eight or ten feet thick, at the depth of five or six feet from the surface.

It is given as a sudorifick, and esteemed a great medicine in fevers, attended with diarrhœas.

TUSSILAGO, coltsfoot, in botany, a genus of the syngenesia polygamia superflua class. The common coltsfoot has a long, slender, whitish, tender root, with stalks that rise to the height of a foot, which are hollow within, downy, redish, and covered with leaves, without pedicles; these are long-pointed, placed alternately, and at the top of the stalks the flowers are produced, which being decayed, the other leaves appear, which are very large, a little angular, almost round, green above, and whitish and downy underneath; it grows in moist places, and on the borders of rivers, brooks, ponds, and ditches; and flowers in the spring.

Coltsfoot is an excellent medicine to abate the sharpness of the humours, to cleanse ulcers of the breast, and to facilitate expectoration. There are many that are troubled with an asthma who cut the leaves small and mix it with tobacco for smoaking, and they affirm, that they find great benefit thereby; it is also thought good so used against defluxions of rheums and superfluous humidities; many account it a good cooler and healer outwardly applied.

TUTOR, in the civil law, is one chosen to look to the person and estate of children left by their fathers and mothers in their minority.

TUTOR, is also used in our universities for a member of some college or hall, who takes on him the instruction of some young students in the arts or faculties.

TUTTY, *Tutia*, a recrement of mixed metals, in which lapis-calaminaris, or zink in its metallick form, is an ingredient, collected in the furnaces where brass is made from copper and calamine, and where the mixed metals are run. In these furnaces they place, under the roofs and about the upper parts of the sides, rods of iron, and sometimes rolls of dry earth, about which the tutty is afterwards found. Therefore the tutty which we use in the shops at this time, owes its origin truly and properly to zink, which sublimes with a very small fire into a kind of flowers, and when fused with any other metal, flies from it in abundance under this form, and also frequently takes some part of this metal, more or less, up with it. Hence it is evident that the tutty or cadmia of the ancients, must have been wholly different from ours, as they used no zink nor any of its ores in the furnace where they collected it.

Our tutty then is a hard and heavy semi-metallick recrement, sometimes met with in the shops in thin flat pieces or flakes, but most abundantly in tubular cylindrick pieces, resembling segments of the barks of trees pushed off from the branches without breaking; these are of different lengths and diameters. The finest tutty is that of a fine deep brown on the outside, and of a yellowish tinge within; the thickest, brightest, and most granulated; the hardest to break, and that which has least foulness among it.

Tutty is celebrated as an opthalmick, and frequently employed as such in unguents and collyria.

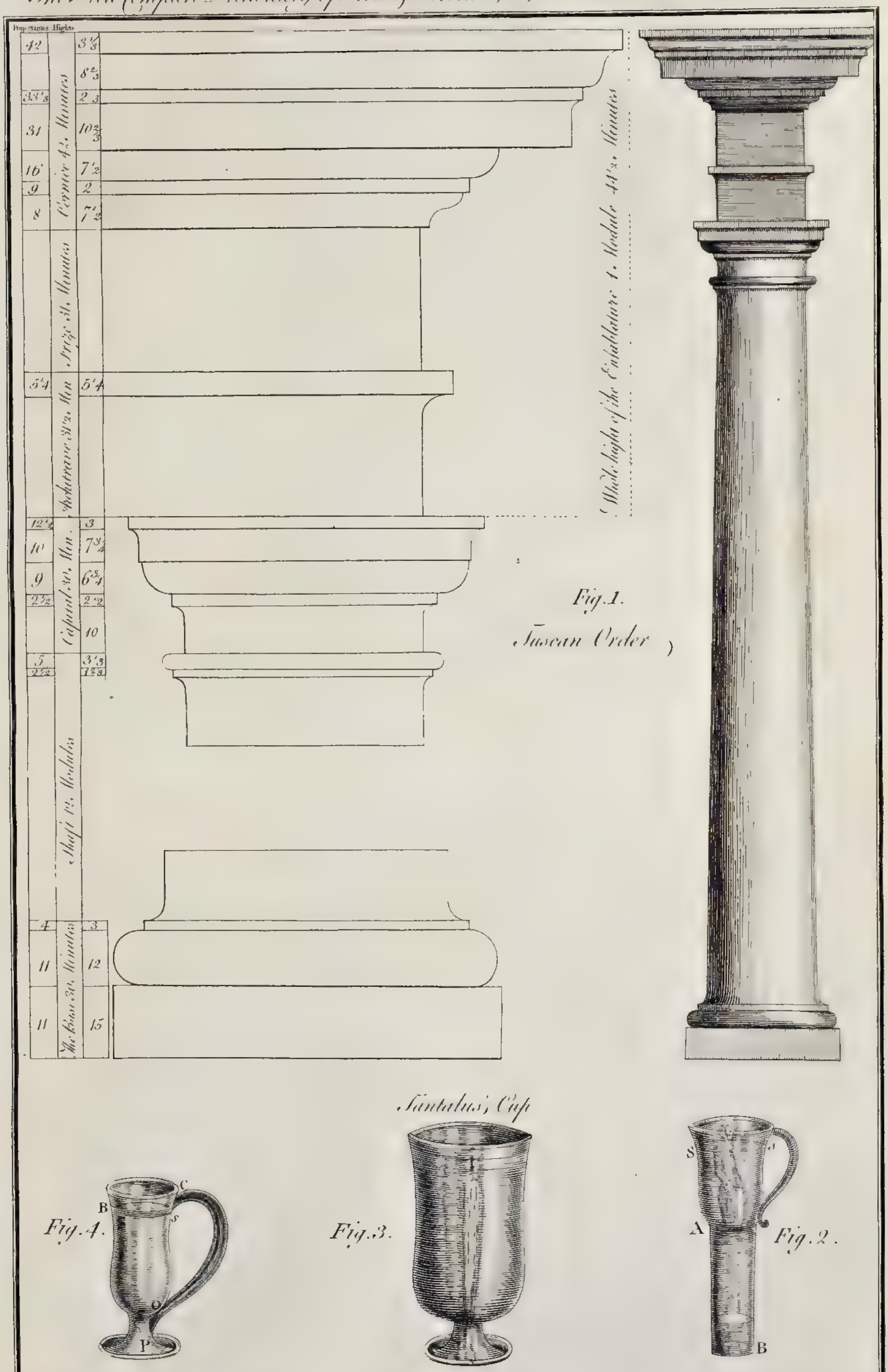
TWELFTH-DAY, or TWELFTH-TIDE, the festival of the Epiphany, or the manifestation of Christ to the Gentiles; so called, as being the twelfth day, exclusive, from the nativity, or Christmas-day.

TWELVE MEN, otherwise called jury, or inquest, is a number of 12 persons, or upwards, as far as 24, by whose oath, as to matters of fact, all trials pass, both in civil and criminal cases, through all courts of the common law in this realm.

TWILIGHT, *Crepusculum*, that light, whether in the morning before sun-rise, or in the evening after sun-set, supposed to begin and end when the least stars that can be seen by the naked eye cease, or begin to appear.

The rays of the sun, being scattered over some of those parts of the air which are within our visible horizon, causes the twilight both morning and evening; the morning twilight begins when the sun is no more than about 18° below our rational horizon; as he grows nearer rising, his light spreads further round, and enlightens a larger portion of our air, and it grows lighter and lighter till sun-rise; in like manner, after sun-set the light gradually decreases, till the sun is got so low that none of his rays can reach the western parts of the air within our visible horizon, or not enough to cause any sensible light there; and then the evening twilight ends; this happens when the sun's depression below the rational horizon is above 18 degrees.

The twilight has hitherto been considered only as it is caused by the light of the sun himself reflected to us; but, besides this, the body of the sun is encompassed with a sphere of light, which is either the æther that immediately surrounds him, heated to such a degree as to become luminous, or the sun's atmosphere, consisting of fiery particles emitted from his body, but retained near him by attraction; this being of larger dimensions than the sun, must rise before him and set after him, and, consequently, lengthens the twilight by luminating our air when the sun is at too large a depression to reach it with his own light; this is also the cause that the rising sun is preceded by a luminous segment of a circle in the east, different from the light which the atmosphere reflects from the body of the


Proportions Heights
42
3⅓
8⅔
33⅓
2⅓
31
10⅔
16
7½
9
2
8
7½
Cornice 42½ Minutes
Frize 31 Minutes
5¼
5¼
Architrave 32½ Min.
Whole height of the Entablature 1 Module 44½ Minutes
12½
3
10
7¾
9
6¾
2½
2½
10
5
3⅓
2½
1⅔
Capital 30 Min.
Shaft 12 Modules
4
3
11
12
11
15
The Base 30 Minutes
Fig.1.
Tuscan Order
Tantalus's Cup
B
C
S
O
P
Fig.4.
Fig.3.
S
S
A
B
Fig.2.

the ſun; the like to this may be obſerved in the weſt, juſt after ſun-ſet.

TWINS, two young ones delivered at a birth, by an animal which ordinarily brings forth but one.

Twins, in aſtronomy, the ſame with Gemini. See Gemini.

TYCHONICK System, or Hypothesis, an order or arrangement of the heavenly bodies, of an intermediate nature between the Copernican and Ptolemaick, or participating alike of them both.

This ſyſtem had its name and origin from Tycho Brahe, a nobleman of Denmark, who lived in the latter part of the laſt century. This philoſopher, though he approved of the Copernican ſyſtem, yet could not reconcile himſelf to the motion of the earth; and being on the other hand convinced the Ptolemaick ſcheme could not be true, he contrived one different from either. In this the earth has no motion allowed it, but the annual and diurnal phænomena are ſolved by the motion of the ſun about the earth, as in the Ptolemaick ſcheme; and thoſe of Mercury and Venus are ſolved by this contrivance, though not in the ſame manner, nor ſo ſimply and naturally as in the Copernican ſyſtem. The Tychonick ſyſtem then ſuppoſed the earth in the centre of the world, that is, of the firmament of ſtars, and alſo of the orbits of the ſun and moon; but at the ſame time it made the ſun the centre of the planetary motions, viz. of the orbits of Mercury, Venus, Mars, Jupiter, and Saturn. Thus the ſun, with all its planets, was made to revolve about the earth once a year to ſolve the phænomena ariſing from the annual motion, and every 24 hours, to account for thoſe of the diurnal motion. But this hypotheſis is ſo monſtrouſly abſurd, and contrary to the great ſimplicity of nature, and in ſome reſpects, even contradictory to appearances, that it obtained but little credit, and ſoon gave way to the Copernican ſyſtem.

After this ſcheme had been propoſed for ſome time, it received a correction, by allowing the earth a motion about its axis to account for the diurnal phænomena of the heavens; and ſo this came to be called the ſemi-Tychonick ſyſtem. But this was ſtill void of the truth, and encumbered with ſuch hypotheſis, as the true mathematician and genuine philoſopher could never reliſh.

TYLE, or Tile, in building, a ſort of thin, factitious, laminated brick, uſed on the roofs of houſes; or, more properly, a kind of fat clayey earth, kneaded and moulded of a juſt thickneſs, dried and burnt in a kiln like a brick, and uſed in the covering and paving of houſes. Tyles are made, ſays Mr. Leybourn, of better earth than brick-earth, and ſomething nearer a-kin to the potter's earth. According to 17 Edward IV. the earth for tyles ſhould be caſt up before the firſt of November, ſtirred and turned before the firſt of February, and not made into tyles before the firſt of March; and ſhould likewiſe be tried and ſevered from ſtones, marle and chalk.

As to the method of applying tyles, ſome lay them dry as they come from the kiln, without mortar or any thing elſe; others lay them in a kind of mortar made of loam and horſe-dung. In ſome parts, as in Kent, they lay them in moſs. See Mortar.

Tyle, in aſſaying, a ſmall flat piece of dried earth, uſed to cover the veſſels in which metals are in fuſion.

TYLER, one that covers or paves with tyles. Tylers and bricklayers were incorporated 10 Eliz. under the name of maſter and wardens of the ſociety of freemen of the myſtery and art of tylers and bricklayers.

TYLWITH, in matters of heraldry and deſcent, is ſometimes uſed for a tribe or family branching out of another, which the modern heralds more uſually call the ſecond or third houſe.

TYMPAN, or Tympanum, in architecture, the area of a pediment, being that part which is in a level with the naked of the frieze. Or it is the ſpace included between the three corniches of a triangular pediment, or the two corniches of a circular one.

Sometimes the tympan is cut out, and the part filled with an iron lattice to give light, and ſometimes it is enriched with ſculpture in baſſo relievo.

Tympan, among joiners, is alſo applied to the panels of the doors.

Tympan *of an Arch*, is a triangular ſpace or table in the corners or ſides of an arch, uſually hollowed, and enriched ſometimes with branches of laurel, olive-tree, or oak, or with trophies, &c. ſometimes with flying figures, as fame, &c. or ſitting figures, as the cardinal virtues.

Tympan, among printers, a double frame belonging to the preſs, covered with parchment, on which the blank ſheets are laid in order to be printed off.

TYMPANUM, or Tympan, in mechanicks, a kind of wheel placed round an axis or cylindrical beam, on the top of which are two levers or fixed ſtaves, for the more eaſy turning the axis, in order to raiſe a weight required. The tympanum is much the ſame with the peritrochium, but that the cylinder of the axis of the peritrochium is much ſhorter, and leſs than the cylinder of the tympanum.

Tympanum *of a Machine*, is uſed for an hollow wheel, wherein one or more people, or other animals, walk to turn it; ſuch as that of ſome cranes, calenders, &c.

Tympanum, in anatomy, the middle part of the ear. See Ear.

TYMPANY, *Tympanites*, in medicine, a flatulent tumour or ſwelling of the abdomen or belly, very hard, equable and permanent, whereby the ſkin is ſtretched ſo tight, that when ſtruck it gives a ſound like that of a drum. Hoffman obſerves, that this diſeaſe has been generally accounted, both by the ancients and moderns, a ſpecies of dropſy, but very improperly, for though it is often productive of, or complicated with an aſcites, yet it is in itſelf a perfectly diſtinct diſeaſe, and accompanied with no extravaſation of water in the abdomen; perſons who have died of it having been found, on opening the body, with the abdomen as dry as in a ſtate of health; but the ſtomach has been found, in ſome, greatly diſtended with flatulencies, and containing a viſcid humour, though in no great quantity. The inteſtines are alſo uſually found diſtended, and, as it were, pellucid; and, on being pricked, they collapſe, without the appearance of any water. And, in ſome caſes, on opening the abdomen, the whole ſwelling has ſubſided, on the excluſion of a groſs flatulence which had diſtended it. The inteſtines have, in ſome ſubjects, been found diſtended to the bigneſs of a man's thigh, in ſome parts, and in others, lower down, ſo contorted and twiſted together, that there could be no paſſage either for the wind or the excrements. It is not uncommon alſo, on diſſection, to find great numbers of worms, of the common long kind, in the inteſtines. See Dropsy.

A tympany, without a dropſy, is moſt incident to women after labour, when the lochia have been ſuppreſſed by colds or otherwiſe, or diſcharged in too ſmall quantities; a bad regimen during the lying-in, and the omitting to ſwathe the belly properly down, has alſo often a bad effect this way. In caſes of this kind, women find ſoon afterwards the abdomen inflated, with a conſiderable uneaſineſs, a difficulty of breathing, coſtiveneſs, and an unaccountable anxiety. Theſe are the breeding ſymptoms of the approaching tympany; and the ſame often happens after unſkilful treatment in abortions, and after the leaving a part of the lochia behind, or the injuring the uterus in delivery.

Children are alſo ſubject to tympanies, when violently afflicted with worms, and ſometimes after the meaſles and ſmall-pox; and if due care is not taken of theſe caſes, at their beginning, the ſuperior parts ſoon become extenuated, and the patient dies. Extreme voracity of children, alſo, and their eating great quantities of food, at a time when the ſtomach is weak, ſometimes brings on this diſorder.

The tympany is juſtly accounted one of the moſt dangerous kinds of diſeaſes, ſince the perſons afflicted with it oftener die than recover. When it is accompanied with a dropſy, it is ſcarce ever cured; and a ſimple tympany in women and children, if neglected at firſt, degenerates into a chronick diſorder, and hardly admits of a cure. Some, indeed, have gone ſo far as to ſay, they never knew a patient, afflicted with a tympany, recover; but this ſeems too raſh a judgment. That diſtention of the abdomen, which is properly called a flatulent cholick, is by ſome accounted a ſpecies of tympany: but this is not naturally dangerous, and is eaſily cured, except when it is attended with ſpaſms of the viſcera; in which caſe the medicines given to reſtore the due tone of the inteſtines, are by no means proper in regard to the ſpaſms.

In curing flatulencies of the ſtomach and inteſtines, the phyſician's principal intention is to promote a diſcharge of the vapours by the anus, and to attenuate and gently carry off, by ſtool, the tough and viſcid matter which contributes to the generation of the flatulencies. For this purpoſe, firſt derivative, diſcutient, and evacuating clyſters are to be uſed, ſuch as thoſe prepared of hyſſop, clary, flowers of common and Roman chamomile, tops of yarrow, juniper-berries, and the larger carminative ſeeds, with veal broth, adding a ſufficient quantity of ſal gemmæ, ſal ammoniack, or Epſom ſalt, and the oil of chamomile. But it is to be obſerved, that one or two clyſters are not ſufficient for removing the diſorder, but they are frequently to be repeated. With theſe are to be interpoſed laxatives, poſſeſſed of a carminative, and, at the ſame time, ſomewhat of an anodyne quality. Or, if the patient is ſtrong, and the inflation a real tympanites, two parts of the extractum panchymagogum crolli, with one part of the pilulæ wildeganſi, or of the pilulæ ſtarckii, or pilulæ de ſtyrace, in ſome ſpirituous carminative water, is to be exhibited.

After theſe, are to be uſed medicines poſſeſſed of a moderate balſamick principle, and a volatile, oleous, and aromatick ſalt, commonly called carminatives; but the operation of theſe medicines is not to be ſo explained, as if, by their ſubtile volatile ſalt, they attenuate the matter of the flatulencies, and render it thinner; but rather, becauſe, by invigorating the tone and ſyſtole of the inteſtinal coats, they hinder the ſtagnation of the flatulencies, move them from their ſeat, and render them more capable of being eaſily eliminated, or prevent the generation of new flatulencies; for, as the deſtroyed periſtatick motion of the ſtomach and inteſtines is the principal cauſe of flatulencies, ſo all medicines which have a remarkable virtue in ſtrengthening theſe parts, are moſt proper for the removal of this diſorder.

The beſt and moſt approved of this kind, are powders prepared of the roots of wake-robin, zedoary, and white burnet; the digeſtive ſalt of ſylvius, or vitriolated tartar; cumin ſeeds, the tops of the leſſer centaury, and dried orange-peel, each a drachm, and ſix drops of the genuine oil of chamomile, or of the oil of cedar, or of the oil of orange-peel; to which, if there is a ſuſpicion of an aſcid lodged in the primæ viæ, we may commodiouſly add crabs eyes.

To this claſs of medicines may be referred the following liquid form: Take of the carminative water of Dorncrellius, of the waters of common chamomile and zedoary prepared with wine, each one ounce; of the ſpiritus nitri dulcis, of the pure oil of carraway, eight drops mixed with two drachms of ſugar.

Nor are external remedies, ſuch as liniments, applied by way of ointment to the whole epigaſtrick region, to be neglected. The principal ingredients of theſe liniments, ought to be boiled with oils of chamomile and rue, oil of nutmeg and Peruvian balſam, with which may be mixed the oils of juniper, carraway, aniſe, or cumin. But preferable to all others, the liquid balſam of life may be uſed; which, when mixed with three parts of Hungary water, and applied by way of ointment to the abdomen, or laid on with a warm linen cloth, is found of great efficacy.

TYPE, *Typus*, a copy, image, or reſemblance of ſome model. This word is much uſed, among divines to ſignify a ſymbol, ſign, or figure of ſomething to come; in which ſenſe it is commonly uſed with relation to antitype, which is the thing itſelf, whereof the other is a type or figure. See Antitype.

Type *of Conſtans*, a formulary or model of faith, publiſhed by the emperor Conſtans, who being a favourer of the Monothelites, and exaſperated at the little ſucceſs which the ecthesis of his uncle, Heraclius, had met with, publiſhed a new formulary in the manner of an edict, in 648, forbidding all perſons to make uſe of the expreſſions "one" or "two wills in Jeſus Chriſt."

Martin I. condemned the type in the Lutheran council, anno 649, and the ſynod made a canon expreſſly againſt this heretical model; at which the emperor was ſo enraged, that he forced the pope into baniſhment.

Type, among letter-founders and printers, the ſame with letter. See Letter.

Type is alſo uſed to denote the order obſerved in the intenſion and remiſſion of fevers, pulſes, &c.

TYPHODES, in medicine, a kind of ardent or burning fever, uſually attending on eryſipelaſes of any of the viſcera.

Of this diſorder, according to Hippocrates, there are five ſpecies. The firſt is a legitimate continual fever, which impairs the ſtrength, is accompanied with a pain of the belly, and a preternatural heat of the eyes, hinders the patient from looking ſteadily on any object whatſoever, and renders him unable, in conſequence of the violent pain, to ſpeak.

The ſecond ſpecies begins with a tertian or quartan fever. The patient diſcharges a great quantity of ſaliva and worms from his mouth; his eyes are painful; his feet, and ſometimes his whole body, are ſeized with ſoft ſwellings; his breaſt is now and then painful, his belly rumbles, his eyes are fierce, he ſpits a great deal, and his ſaliva ſticks to his throat.

The third ſpecies is known by intenſe pain in the joints, and ſometimes over all the body; the blood, contaminated by the bile, becomes hot, and ſtagnates in the limbs.

The fourth ſpecies is known by a violent tenſion, elevation, and heat of the abdomen, ſucceeded by a diarrhœa, which ſometimes ends in a dropſy.

The fifth ſpecies is not unlike the firſt. See Fever.

TYPHOMANIA, in medicine, a diſorder of the brain, wherein the patient not being able to ſleep, though greatly inclined thereto, lies with his eyes ſhut, talks abſurdly, and flings himſelf this way and that.

The typhomania is a kind of combination of a frenzy with a lethargy, and is much the ſame with a coma vigil, or a preter-natural propenſity to ſleep.

TYPOGRAPHY, the art of printing. See the article Printing.

TYRANT, *Tyrannus*, among the ancients, denoted ſimply a king or monarch. But the ill uſe ſeveral perſons inveſted with that ſacred character made of it, has altered the import of the word, and tyrant now carries with it the idea of an unjuſt and cruel prince.

TYROSIS, a diſorder of the ſtomach, proceeding from milk coagulated therein.

U.

U, The 20th letter, and fifth vowel of our alphabet, is formed in the voice by a round configuration of the lips, and a greater extrufion ofthe under one than in forming the letter o, and the tongue is alfo more cannulated. The found is fhort in curft, muft, tun, tub; but is lengthened by a final e, as in tune, tube, &c. In fome words it is rather acute than long; as in brute, flute, lute, &c. It is moftly long in polyfyllables; as in union, curious, &c. but in fome words it is obfcure, as in nature, venture, &c. This letter, in the form V, is properly a confonant, and as fuch is placed before all the vowels; as in vacant, venal, vibrate, &c. Though the letter v and u had always two founds, they had only the form v till the beginning of the fourth century, when the other form was introduced, the inconvenience of expreffing two different founds by the fame letter having been obferved long before.

In numerals v ftands for five; and with a dafh added at top, thus, $\bar{v}$, it fignifies 5000.

In abbreviations among the Romans, V. A. ftood for veterani affignati; V. B. viri bono; V. B. A. viri boni arbitratu; V. B. F. vir bonæ fidei; V. C. vir confularis; V.C.C.F. vale, conjux chariffime, feliciter; V. D. D. voto dedicatur; V. G. verbi gratia; Vir. Ve. virgo veftalis; VL. videlicet; V. N. quantum nonarum.

VACATION, in law, is the whole time betwixt the end of one term and the beginning of another.

VACUUM, or VACUITY, in philofophy, denotes a fpace, empty or devoid of all matter or body. It has been the opinion of fome philofophers, particularly the Cartefians, that nature admits not a vacuum, but that the univerfe is entirely full of matter: in confequence of which opinion they were obliged to affert, that if every thing contained in a veffel could be taken out, or annihilated, the fides of the veffel, however ftrong, would come together; but this is contrary to experience, for the greateft part of the air may be drawn out of a veffel by means of the air-pump, notwithftanding which, it will remain whole, if its fides are ftrong enough to fupport the weight of the incumbent atmofphere.

Should it be objected here, that it is impoffible to extract all the air out of a veffel, and that there will not be a vacuum on that account; the anfwer is, that fince a very great part of the air that was in the veffel may be drawn out, as appears by the more quick defcent of light bodies in a receiver when exhaufted of its air, there muft be fome vacuities between the parts of the remaining air; which is fufficient to conftitute a vacuum. Indeed, to this it may be objected by a Cartefian, that thofe vacuities are filled with materia fubtilis, that paffes freely through the fides of the veffel, and gives no refiftance to the falling bodies: but, as the exiftence of this materia fubtilis can never be proved, we are not obliged to allow the objection, efpecially fince Sir Ifaac Newton has found, that all matter affords a refiftance nearly in proportion to its denfity.

There are many other arguments to prove this, particularly the motions of the comets through the heavenly regions, without any fenfible refiftance; the different weight of bodies of the fame bulk, &c.

All the parts of fpaces, fays Sir Ifaac Newton, are not equally full: for if they were, the fpecifick gravity of the fluid which would fill the region of the air, could not, by reafon of the exceeding great denfity of its matter, give way to the fpecifick gravity of quickfilver, gold, or any body, how denfe foever: whence neither gold, nor any other body, could defcend in the air; for no body can defcend in a fluid, unlefs it be fpecifically heavier than it. But, if a quantity of matter may, by rarefaction, be diminifhed in a given fpace, why may it not diminifh in infinitum? And if all the folid particles of bodies are of the fame denfity, and cannot be rarified, without living pores, there muft be a vacuum.

VACUUM BOYLEANUM, is fometimes, though improperly, ufed to exprefs the approach to a real vacuum, by means of an air-pump.

VADE-MECUM, or VENI-MECUM, a Latin phrafe, ufed, in Englifh, to exprefs a thing that is very handy and familiar, and which one ufually carries about with them; chiefly applied to fome favourite book.

VADIMONIUM, in the civil-law, a promife or bond, given for appearance before the judge upon a day appointed.

VAGABOND, or VAGRANT, in law. See the article VAGRANTS.

VAGINA, properly fignifies a fheath, or fcabbard: and the term vagina is ufed, in architecture, for the part of a terminus, becaufe refembling a fheath, out of which the ftatue feems to iffue.

VAGINA, in anatomy, a large canal, formed of a robuft and ftrong membrane, and reaching from the external orifice, or os pudendi, in women, to the uterus.

VAGRANTS, in law, are defcribed to be perfons pretending to be patent-gatherers, or collectors for prifons, and wander about for that end; among which are included all fencers, bear-wards, common players of interludes, minftrels, jugglers; all perfons pretending to be gypfies, or wandering in the habits of fuch, or pretending fkill in phyfiognomy, palmeftry, or the like, or to tell fortunes; all fuch as ufe any fubtle craft, unlawful games or plays; or, being able in body, run away, leaving their wives or children to the parifh; all perfons who cannot otherwife maintain themfelves, that loiter about and refufe to work for the ufual wages; and all other perfons wandering abroad and begging, &c.

It is enacted, that where any fuch vagrants fhall be found in a parifh, the conftable, or other officer, is immediately to apprehend them, and carry them before fome juftice of the peace, who fhall examine the perfons on oath, as to their condition, and places of abode; and thereupon order them to be fent by pafs to the place of their laft legal fettlement; or if that cannot be known, to the place of their birth. The juftice is to give the conftable a certificate afcertaining how, and in what manner, they fhall be conveyed, &c.

And juftices of the peace, in their feffions, have power to appoint rates for paffing of vagrants, at fo much per mile.

VAGUM, or PAR VAGUM, in anatomy, the eighth pair of the nerves arifing from the medulla oblongata.

VAIR, in heraldry, a kind of fur, confifting of divers little pieces, argent and azure, refembling a Dutch U, or a bell-glafs.

Vairs have their point azure oppofite their point argent, and the bafe argent to the bafe azure.

VAIRY, VAIRE, VERRY, or VARRY, in heraldry, expreffes a coat, or the bearings of a coat, when charged or chequered with vairs; and hence, vairy cuppy, or vairy-taffy, is a bearing compofed of pieces reprefenting the tops of crutches.

VALENTINIANS, in church hiftory, a fect of Chriftian hereticks, who fprung up in the fecond century, and were fo called from their leader Valentinus.

VALERIAN, *Valeriana*, in botany, a plant whofe root is of confiderable ufe in medicine. There are various kinds of valerian, but thofe chiefly in ufe, are the large garden valerian, and the great wild valerian; the latter of which is preferred for medicinal purpofes; it grows on dry chalky land and fhady places in divers parts of England, and flowers in May or June: the root is bitter,

bitter, ftyptick, and has a difagreeable aromatick fmell. This root taken up at a proper feafon, and carefully dried, is one of the beft nervous fimples of the fhops. The late Dr. James Douglas took great pains to introduce it into general ufe, and fucceeded very happily in the attempt. It is given in powder from five grains to a fcruple for a dofe, and alfo in tinctures and infufion. It is found of the greateft fervice in all diforders of the nerves, and will go farther in curing an epilepfy, than, perhaps, any other fingle medicine in ufe, many very deplorable cafes of this kind having been cured fingly by it: It is alfo recommended againft intermittent fevers, but it is lefs known, at prefent, in that intention. The College of Phyficians have thought fo well of this root, as to order two tinctures of it to be kept in the fhops, the one under the name of the fimple, the other under that of the volatile tincture of valerian.

VALET, in the menage, a ftick armed at one end with a blunted point of iron, to prick and aid a leaping horfe.

VALETUDINARY, *Valetudinarius*, among medical writers, denotes a perfon of a weak and fickly conftitution, and frequently out of order.

VALID, in law, an appellation given to acts, deeds, tranfactions, &c. which are cloathed with all the formalities requifite to their being put into execution, and to their being admitted in a court of juftice. See ACT, DEED, &c.

VALUE, *Valor*, in commerce, denotes the price or worth of any thing: hence the intrinfick value denotes the real and effective worth of a thing, and is ufed chiefly with regard to money, the popular value whereof may be raifed and lowered at the pleafure of the prince; but its real or intrinfick value, depending wholly on its weight and finenefs, is not at all affected by the ftamp or impreffion thereon.

VALVE, *Valvula*, in hydraulicks, pneumaticks, &c. is a kind of lid, or cover, of a tube or veffel, fo contrived as to open one way; but which, the more forcibly it is preffed the other way, the clofer it fhuts the aperture; fo that it either admits the entrance of a fluid into the tube or veffel, and prevents its return; or admits its efcape, and prevents its re-entrance. See PUMP.

VALVE, in anatomy, a thin membrane applied on feveral cavities and veffels of the body, to afford a paffage to certain humours going one way, and prevent their reflux towards the place from whence they came.

The veins and lymphaticks are furnifhed with valves, which open towards the heart, but keep clofe towards the extremities of thofe veffels; that is, they let the blood and lymph pafs towards the heart, but prevent their returning towards the extreme parts from whence they came.

VAPOUR, *Vapor*, in philofophy, the moift and moft volatile particles of bodies, feperated by heat, and raifed into the atmofphere.

That vapours are raifed from the furface of water, and moift bodies, by the action of the fun's heat, is agreed on by all: but the manner in which this is done, continues ftill a controverted point among philofophers.

The moft generally received opinion, however, is, that by the action of the fun on the furface of the water, the aqueous particles become formed into bubbles, filled with a flatus, or warm air, which renders them fpecifically lighter than common air, and makes them rife therein, till they meet with fuch as is of the fame fpecifick gravity with themfelves.

VARIABLE, in geometry, and analyticks, is a term applied, by mathematicians, to fuch quantities as either increafe or diminifh, according as fome other quantity either increafes or diminifhes.

VARIANCE, *Variantia*, in law, an alteration or change of condition in a perfon or thing, after fome former concern or tranfaction therewith.

VARIANCE, is alfo ufed for an alteration of fomething formerly laid in a plea; or where the declaration in a caufe differs from the writ, or from the deed upon which it is grounded.

VARIATION, in geography, navigation, &c. a term applied to the deviation of the magnetick needle, or compafs, from the true north point of the horizon.

The knowledge of the variation of the compafs is of great ufe in navigation.

VARIATION *of the Moon*, in aftronomy, is the third inequality obferved in that planet's motion. See MOON.

VARIEGATION, among botanifts and florifts, the act of ftreaking or diverfifying the leaves, &c. of plants and flowers with feveral colours.

Variegation is either natural or artificial. Of natural variegation there are four kinds; the firft fhewing itfelf in yellow fpots here and there, in the leaves of plants called, by gardeners, the yellow bloach.

The fecond, called the white bloach, marks the leaves with a greater number of white fpots, or ftripes; the whiteft lying next the furface of the leaves, ufually accompanied with other marks of a greenifh white, that lie deeper in the body of the leaves.

The third, and moft beautiful, is where the leaves are edged with white, being owing to fome diforder or infection in the juices, which ftains the natural complexion or verdure of the plant.

The fourth kind is that called the yellow edge.

Artificial VARIEGATION, is performed by inarching or inoculating a ftriped or variegated plant into a plain one of the fame fort, as a variegated common jeffamin into a plain, common, Spanifh, Brazil, or Indian jeffamin.

VARIOLÆ, or VARIOLI, a contagious difeafe, popularly called the fmall-pox. See SMALL-POX.

VARIORUM, in matters of literature, a term or phrafe of abbreviation, ufed for an edition of a claffick author, printed in Holland, with the notes of divers authors thereupon. The Variorums for the moft part are the moft valued editions.

VARNISH, or VERNISH, *Vernix*, a thick, vifcid, fhining liquor, ufed by painters, gilders, &c. to give a glofs and luftre to their works, and defend them from the weather, duft, &c. There are feveral kinds of varnifhes in ufe, as the ficcative or drying varnifh, made of oil of afpin, turpentine, and fandarach melted together.

White varnifh, called alfo Venetian varnifh, made of oil of turpentine, fine turpentine, and maftick.

Spirit of wine varnifh, made of fandarach, white amber, gum elemi and maftick; ferving to gild leather, picture-frames, &c. withal.

Gilt varnifh, made of linfeed oil, fandarach, aloes, gamboage, and litherge of gold.

China varnifh, made of gum lacca, colophony, maftick, and fpirit of wine.

Common varnifh, which is only common turpentine, diffolved in oil of turpentine.

VARNISH alfo fignifies a fort of fhining coat, wherewith potters-ware, Delft-ware, China-ware, &c. are covered, which gives them a fmoothnefs and luftre. Melted lead is generally ufed for the firft, and fmalt for the fecond.

VARNISH, among medalifts, fignifies the colours antique medals have acquired in the earth.

VAS, a veffel, either for mechanical, chemical, culinary, or any other ufes. In anatomy, all the parts which convey a fluid are called veffels, as the veins, arteries, and lymphaticks.

VASCULAR, *Vafcularis*, in anatomy, is applied to any thing confifting of divers veffels, veins, arteries, &c.

VASCULIFEROUS *Plants*, among botanifts, fuch as have a peculiar veffel or cafe to contain the feed which is fometimes divided into cells.

VASES, in architecture, are ornaments of fculpture placed on focles or pedeftals, reprefenting the veffels of the ancients; particularly thofe ufed in facrifice, as the præfericulum, fimpulum, incenfe-pots, flower-pots, &c. and occafionally enriched with baffo relievo's.

VASE, is particularly ufed in architecture, to fignify the body of the Corinthian and Compofite capital; called alfo the tambour or drum; and, fometimes, the campana or bell.

VASE, is alfo fometimes ufed, among florifts, for that they otherwife call the calyx.

Goldfmiths, braziers, &c. alfo ufe vafe for the middle of a church candleftick; which is ufually of a roundifh figure, bordering fomewhat on that of a vafe.

VASSAL, *Vaffallus*, in our ancient cuftoms, a perfon who vowed fidelity and homage to a lord, on account of fome land, &c. which he had of him in fee.

VASSALAGE, the ftate of a vaffal, or a fervitude and dependency on a fuperior lord.

VASTO, in law, a writ that lies againft the tenent for life or years, for making wafte.

VASTUS, in anatomy, a name common to two mufcles of the leg, diftinguifhed into internal and external,

nal, thus called from their largeneſs; both of them ſerving to extend the leg.

VAT, or FAT, a kind of veſſel, uſed to hold wine, ale, beer, cyder, or any other liquor, in the time of its preparation.

VAULT, *Fornix*, in architecture, a piece of maſonry-arch, ſo contrived that the ſtones which form it ſuſtain each other by their diſpoſition.

Vaults are, on many occaſions, to be preferred to foſſils or flat cielings, as they give a greater height and elevation, and are beſides more firm and durable.

Salmaſius obſerves, that the ancients had only three kinds of vaults. The firſt was the fornix, made cradle-wiſe; the ſecond a teſtudo, i. e. tortoiſe-wiſe, which the French call cul de four, or oven-wiſe; and the third concha, or trumpet-wiſe.

But the moderns have ſubdivided theſe three ſorts into many more, to which they have given different names, according to their figures and uſes; ſome of them are circular and others elliptical.

Again, the ſweeps of ſome are larger, other leſs portions of a ſphere. All ſuch as are above hemiſpheres are called high or ſurmounted vaults; and all that are leſs than hemiſpheres, are called low or ſurbaſed vaults, or teſtudines.

In ſome vaults the height is greater than the diameter; in others, it is leſs: others again are quite flat, and only made with haunſes; others like ovens, or in the form of a cul de four, &c. and others growing wider, as they lengthen, like a trumpet.

There are alſo Gothick vaults, with ogives, &c.

Of vaults, ſome again are ſingle, others double, croſs, diogonal, horizontal, aſcending, deſcending, angular, oblique, pendent, &c.

Maſter VAULTS, are thoſe that cover the principal parts of buildings, in contradiſtinction to the upper or ſubordinate vaults, which only cover ſome little part, as paſſage, or gate, &c.

Double VAULT, is one that is built over another, to make the outer decoration range with the inner, or, to make the beauty and decoration of the inſide conſiſtent with that of the outſide, leaves a ſpace between the concavity of the one and the concavity of the other. Inſtances of which we have in the dome of St. Peter's at Rome, St. Paul's in London, and in that of the invalids at Paris.

VAULTS *with Compartments*, are ſuch whoſe ſweep, or inner face, is enriched with pannels of ſculpture, ſeparated by plat-bands. Theſe compartments, which are of different figures, according to the vaults, and uſually gilt on a white ground, are made with ſtone or brick walls, as in the church of St. Peter at Rome, or with plaiſter on timber vaults.

Key of a VAULT, is a ſtone or brick, in the middle of the vault, in form of a truncated cone, ſerving to bind or faſten all the reſt.

Reins, or *Fillings up of a* VAULT, are the ſides which ſuſtain it.

Pendentive of a VAULT, is the part ſuſpended between the arches or orgives.

Impoſt of a VAULT, is the ſtone whereon the firſt vouſſoir, or arch-ſtone of the vault, is laid.

UBIQUITY, omnipreſence; an attribute of the Godhead, whereby he is always intimately preſent to all things; gives the eſſe to all things; knows, preſerves, and does all in all things.

UDDER, *Uber*, in comparative anatomy, that part in brutes wherein the milk is prepared, anſwering to the mammæ or breaſts of the human kind.

VECTIS, in mechanicks, one of the powers more uſually called lever. See LEVER.

VECTOR, in aſtronomy, a line ſuppoſed to be drawn from any planet moving round a centre on the focus of an ellipſis, to that centre or focus. This, by ſome writers of the new aſtronomy, is called vector, or radius vector, becauſe it is that line by which the planet ſeems to be carried round its centre, and with which it deſcribes areas proportional to the times.

VEDETTE, in the military art, a ſentinel on horſeback detached from the main body of the army, to diſcover and give notice of the enemies deſigns.

VEER, a ſea-term variouſly uſed. Veering out a rope, denotes the letting it out by hand, or letting it run out of itſelf. It is not uſed for letting out any running rope except the ſheets.

VEER is alſo uſed in reference to the wind, for, when it changes often, they ſay, it veers about.

VEGETABLE, *Vegetabile*, in phyſiology, a term applied to all plants, conſidered as capable of growth; i. e. all natural bodies which have parts organically formed for generation and accretion, but not ſenſation.

The vaſcular ſtructure of vegetables is rendered very apparent, by an experiment of Mr. Willoughby: cutting off ſome pretty big branches of birch, and making a ſort of baſon, or reſervoir, on the end thereof with ſoft wax; upon filling this with water and holding the branch upright, the water, in a few minutes, ſunk into the veſſels of the wood, and running quite through the length, dropped out conſiderably faſt; continuing ſo to do as long as the water was poured on. The ſame ſucceeds in a ſycamore, walnut-tree, &c. though the flux here is not ſo copious.

VEGETATION, the act whereby plants and other living bodies receive nouriſhment and grow.

Plants, we learn from the microſcope, conſiſt of different parts, veſſels, &c. analogous to thoſe of the animals; and each kind of veſſel is ſuppoſed to be the vehicle of a different humour, or juice, ſecreted from the maſs of ſap, which is conſidered as the blood, or common fund of them all. See SAP and BLOOD.

VEGETATIVE, *Vegetativus*, a term applied to that principle or part in plants, by virtue whereof they receive nouriſhment, and grow or vegetate.

VEHICLE, *Vehiculum*, in its literal ſenſe, ſignifies ſomething that carries or bears a thing along.

VEIN, in anatomy, a veſſel which conveys the blood from the artery back to the heart.

The veins are only a continuation of the extreme capillary arteries, reflected back again towards the heart, and uniting their channels as they approach it, till at laſt they all form three large veins; the cava deſcendens, which brings the blood back from all the parts above the heart; the cava aſcendens, which brings the blood from all the parts below the heart; and the porta, which carries the blood to the liver.

The coats of the veins are the ſame with thoſe of the arteries, only the muſcular coat is not as thin in all the veins, as it is in the capillary arteries; the preſſure of the blood againſt the ſides of the veins being leſs than that againſt the ſides of the arteries. In the veins there is no pulſe, becauſe the blood is thrown into them with a continued ſtream, and becauſe it moves from a narrow channel to a wider. The capillary veins unite with one another, as has been ſaid of the capillary arteries. In all the veins which are perpendicular to the horizon, excepting thoſe of the uterus and of the porta, there are ſmall membranes, or valves; ſometimes there is only one, ſometimes there are two, and ſometimes three placed together, like ſo many half thimbles ſtuck to the ſides of the veins, with their mouths towards the heart. In the motion of the blood towards the heart, they are preſſed cloſe to the ſides of the veins; but, if the blood ſhould fall back, it muſt fill the valves, and, they being diſtended, ſtop up the channel, ſo that no blood can repaſs them.

VEIN is alſo uſed, in the ſame ſenſe with ſtratum, for the various diſpoſitions and kinds of matter met with in digging into the bowels of the earth.

VALEMENTUM BOMBYCINUM, a name which ſome anatomiſts give to the velvet membrane, or inner ſkin, of the inteſtines.

VELLICATION, among phyſicians, the act of twitching. The word is more particularly applied to a ſort of ſudden convulſions that happen to the fibres of the muſcles.

VELOCITY, ſwiftneſs, or that affection of motion whereby a moving body is diſpoſed to run over a certain ſpace in a certain ſpace of time. See MOTION.

For the velocity of falling bodies; ſee the article ACCELERATED *Motion*.

VELOM, a kind of parchment, finer, evener, and whiter than the common ſort.

VELVET, a rich kind of ſtuff all ſilk, covered on the outſide with a cloſe, ſhort, fine, ſoft ſhag, the other ſide being a very ſtrong, cloſe tiſſue. The nap or ſhag, called alſo the velveting of this ſtuff, is formed of part of the threads of the warp, which the workman puts on a long

long narrow-channelled ruler or needle, which he afterwards cuts, by drawing a ſharp ſteel tool along the channel of the needle to the ends of the warp.

VENAL, or VENOUS, among anatomiſts, ſomething that bears a relation to a vein.

VENAL, is alſo uſed for ſomething bought with money, or procured by bribes.

VENDEE, in law, the perſon to whom any thing is ſold, in contradiſtinction to vender, or the ſeller.

VENEERING, VANEERING, or FINEERING, a kind of marquetry, or inlaying; whereby ſeveral thin ſlices or leaves of fine wood, of different ſorts, are applied and faſtened on a ground of ſome common wood. There are two kinds of inlaying; the one, which is the more ordinary, goes no farther than the work of compartments of different woods; the other requires a deal more art, and repreſents flowers, birds, and the like figures.

The wood intended for veneering, is firſt ſawed out into ſlices or leaves, about a line thick: in order to ſaw them, the blocks, or planks, are placed upright in a kind of ſawing preſs.

The ſlices are afterwards cut into narrow ſlips, and faſhioned divers ways, according to the deſign propoſed. Then, the joints being carefully adjuſted, and the pieces brought down to their proper thickneſs with ſeveral planes for the purpoſe, they are glued down on a ground or block of dry wood, with good ſtrong Engliſh glue.

The pieces thus joined and glued, the work, if ſmall, is put in a preſs; if large, it is laid on a bench, covered with a board, and preſſed down with poles or pieces of wood. One end thereof reaches to the ceiling of the room, and the other bears on the board.

When the glue is quite dry, they take it out of the preſs and finiſh it; firſt with little planes, then with divers ſcrapers, ſome whereof reſemble raſps, which take off the dents, &c. left by the planes.

When ſufficiently ſcraped, the work is poliſhed with the ſkin of a ſea dog, wax, a bruſh, and a poliſher of ſhave-graſs; which is the laſt operation.

VENEREAL, ſomething relating to venery.

VENEREAL *Diſeaſe*, lues venerea, the French diſeaſe, foul diſeaſe, French pox, &c. is a contagious diſeaſe, contracted by ſome impure humour generally received in coition; and diſcovering itſelf in ulcers and pains, about the genitals and other parts.

As, in this terrible and obſtinate diſorder, the whole maſs of blood and lymph, in conſequence of the malignant taint, aſſumes a putrid, vapid, and viſcid craſis, highly unfriendly to nature, from which alone all the ſymptoms ariſe; ſo, in order to remove this principal cauſe, no more proper intention can be purſued, than through all the emunctories to expel from the body, and its ſmalleſt veſſels and receſſes, the whole maſs of corrupted humours; for, by this means, the moſt violent ſymptoms, ſuch as obſtructions of the ſecretory and excretory glands, together with inflammations, and exulcerations of the bones, and all the ſolid parts ſpontaneouſly ceaſe when their productive cauſe is removed. But, hitherto, there are only two methods known of expelling from the receſſes of the ſolid parts of the whole maſs of peccant and tainted humours; the one by a liberal and long-protracted diſcharge of ſweat, and the other by a ſalivation, continued for a ſufficient time.

VENERIS ŒSTRUM, the ſtimulus or incentive of venery, is an appellation given by ſome anatomiſts to the clitoris.

VENERIS ŒSTRUM is alſo uſed by others for the tranſport of love, or the utmoſt extacy of deſire, or enjoyment, in coition.

VENERY, is uſed for the act of copulation, or coition of the two ſexes.

VENERY alſo denotes the act or exerciſe of hunting wild beaſts, which are alſo called beaſts of venery, and beaſts of the foreſt. See GAME.

VENESECTION, or PHLEBOTOMY, in ſurgery. See PHLEBOTOMY.

VENETA BOLUS, the Venetian bole, a fine red earth uſed in painting, and called in the colour-ſhops Venetian red. It is improperly denominated a bole, being a genuine ſpecies of red ochre. It is of a fine bright, and not very deep red, approaching, in ſome degree, to the colour of minium, or red-lead, and is moderately heavy, and of an even and ſmooth texture, yet very friable, and of a duſty ſurface: it adheres firmly to the tongue, is very ſmooth, and ſoft to the touch, eaſily crumbles to pieces between the fingers, and very much ſtains the ſkin in handling. It has a ſlight aſtringent taſte, and makes no fermentation with acids. It is dug in Carinthia, and ſent from Venice to all parts of the world, being an excellent colour, and very cheap; our colourmen, however, find many ways of adulterating it.

VENIAL, in the Romiſh theology, a term applied to ſlight ſins, and ſuch as eaſily obtain pardon. In confeſſing to the prieſts, people are not obliged to accuſe themſelves of all their venial ſins. The thing that gives the greateſt embarras to the Roman caſuiſts, is to diſtinguiſh between venial and mortal ſins. The reformed reject this diſtinction of venial and mortal ſins, and maintain, that all ſins, how grievous ſoever, are venial, and all ſins, how ſlight ſoever, are mortal. And the reaſon they urge is, that all ſins, though of their own nature mortal, yet become venial or pardonable, by virtue of our Saviour's paſſion, to all ſuch as believe in him, as he is revealed in the goſpel.

VENT, VENT-HOLE, or SPIRACLE, a little aperture left in the tubes or pipes of fountains, to facilitate the air's eſcape; or, on occaſion, to give them air, as in froſty weather, &c. for want of which they are apt to burſt. See PIPE.

Vent is likewiſe applied to the covers of wind-furnaces, whereby the air enters, which ſerves them for bellows, and which are ſtopped with regiſters or ſluices, according to the degree of heat required, as in the furnaces of glaſs-houſes, aſſayers, &c.

VENTER, BELLY, in anatomy, a cavity in the body of an animal, containing viſcera, or other organs neceſſary for the performance of divers functions.

VENTER is alſo uſed in ſpeaking of a partition of the effects of a father or mother, among children born, or accruing from different marriages.

VENTER is alſo uſed for the children whereof a woman is delivered at one pregnancy: thus, two twins are ſaid to be of the ſame venter.

VENTER, or BELLY *of a Muſcle*, is the fleſhy or belly part thereof, as contradiſtinguiſhed from the two tendons, its extremes, one whereof is called the head, and the other the tail of the muſcle. See MUSCLE.

VENTER *Draconis*, dragon's belly, in aſtronomy, denotes the middle of a planet's orbit, or that part moſt remote from the nodes, i. e. from the dragon's head and tail; being the part which has the greateſt latitude, or is at the greateſt diſtance from the ecliptick.

VENTIDUCTS, in building, are ſpiracles or ſubterraneous places, where freſh cool wind being kept, they are made to communicate, by means of tubes, funnels, or vaults, with the chambers or other apartments of a houſe, to cool them in ſultry weather.

VENTILATORS, inſtruments invented by the learned Dr. Hales, for drawing the foul air out of any cloſe place, and ſupplying it with freſh.

VENTRICLE, *Ventriculus*, q. d. little belly, in anatomy, a diminutive of venter, ſignifying a cavity ſmaller than what we expreſs by a venter, or, rather, a diviſion of a venter; or ſome ſmaller cavity contained in a larger.

VENTRICLE, *Ventriculus*, by way of eminence thus called, is the ſame with the ſtomach.

VENTURINE, or ADVENTURINE, is ſometimes uſed for the fineſt and ſlendereſt gold wire uſed by embroiderers.

VENUS, in chymiſtry, the ſame with copper. See COPPER. In aſtronomy, one of the inferior planets, revolving round the ſun in an orbit between that of Mercury and the earth. See PLANET.

According to Mr. Caſſini, the greateſt diſtance of Venus from the earth is 38,415, the mean diſtance 22000, and the leaſt diſtance 5,585 ſemi-diameters of the earth.

And the diameter of Venus is equal to ſeven ſemi-diameters of the earth; therefore, the globe of Venus muſt be near 43 times greater than that of the earth. But Dr. Gregory ſaith, that, to an eye placed in Venus, the ſun's diameter would appear once and a half as big again as it doth to us, and, therefore, his diſk will be more than double of what it appears to us: and the light and heat in this planet, and its gravity towards the ſun, will be in the ſame proportion in reſpect of ours.

The

The length of the day in Venus is but 23 hours.

The eye here will behold four planets above it, viz. our earth, Mars, Jupiter, and Saturn; and one below it, which is Mercury: and when our earth is in opposition to the sun, it will appear then (in the night) to shine with a full orb, and be very bright. The moon will appear always to accompany the earth, and never to be seen from her above half a degree. Mercury will never appear to be above 38 degrees distant from the sun.

Kepler saith, the inclination of the orbit of Venus is 3 deg. and 22 min.

VERB, in grammar, a word serving to express what we affirm of any subject or attribute to it; as the words, is, understands, hears, believes, &c.

The verb is thus called of the Latin *verbum*, word, by way of eminence; as being the principal word of a sentence.

The common definition given by grammarians is, that a verb is a word which betokens being, doing, or suffering.

To conceive the origin and office of verbs, it may be observed, that the judgment we make of any thing, as when I say the earth is round, necessarily includes three terms; the first, called the subject, is the thing we affirm of, e. gr. earth; the second, called the attribute, is the thing affirmed, e. gr. round; the third, *is*, connects these two terms together, and expresses the action of the mind affirming the attribute of the subject. The last is what we properly call the verb.

Verbs are variously divided; with respect to the subject, they are divided into active, passive, neuter, &c. with respect to their inflexions, into regular and irregular; personal and impersonal; auxiliary and substantive, &c.

VERB *Active*, is a verb which expresses an action that falls on another subject or object.

VERB *Passive*, is that which expresses a passion, or which receives the action of some agent, and which is conjugated in the modern tongues with the auxiliary verb, I am, je suis, je sono, &c.

VERB *Neuter*, is that which signifies an action that has no particular object whereon to fall, but which of itself takes up the whole idea of the action; as, I sleep, thou yawnest, he snores, we walk, you run, they stand.

VERB *Substantive*, is that which expresses the being or substance which the mind forms of itself, or supposes in the object, whether it be there or not; as, I am, thou art.

Auxiliary or helping VERBS, are those which serve in conjugating active and passive verbs; such are, I am, I have, &c.

Regular VERBS, are those which are conjugated after some one manner, rule, or analogy.

Irregular or anomalous VERBS, are those which have something singular in the terminations or formations of their tenses.

VERBS *Impersonal*, are those which have only the third person; as, it behoves, &c.

There are also reduplicative verbs; as resound, recall, &c. frequentative verbs, &c.

VERBAL, something that belongs to verbs, or even to words spoke with the mouth.

A verbal contract is that merely made by word of mouth in opposition to that made in writing.

VERBERATION, smiting, in physicks, a term used to express the cause of sound, which arises from a verberation of the air when struck in divers manners by the several parts of the sonorous body first put into a vibratory motion.

VERDIGREASE, a kind of rust of copper of great use among painters for a green colour; also in physick.

This preparation of copper is properly no other than that metal dissolved by a mild acid into the form of an ærugo or rust. After pressing the grapes for wine, the husks, stones, and other refuse, are laid to be dried in the sun; they are then moistened with the strongest wine that can be had, and laid together in vessels till they begin to ferment; after nine or 10 days the matter is pressed, and worked into balls between the hands, and laid in an orderly manner over the bottom of an earthen vessel, and as much wine is laid over them as will cover them half way up. The vessels are then covered with a loose lid, and set in a cellar where the balls are left in the wine about 15 hours, a person turning them four or five times in that space, in order to make the wine soak perfectly through them; after this some wooden bars are placed across the vessel about half an inch above the surface of the wine, and the balls are laid out of the wine upon these; the vessels are then shut up, and the whole left in this state 10 days or more. At the end of this time the balls emit a very penetrating scent, and are fit for dissolving copper. They are now to be broke in pieces, and the outside mixed with the internal part, which is moisture; they are then laid with thin plates of copper stratum super stratum in the same vessels upon the bars, and the whole is left for a week or fortnight, at the end of which time the plates are found covered with verdigrease, which is not taken off immediately, but they are wrapped up in cloths wetted with wine, and laid by a week or more, and then the ærugo or verdigrease is taken off for use.

VERDERER, or VERDEROR, a judicial officer of the king's forest, whose business is to look to the vert, and see it well maintained.

VERDICT, is the answer of the jury given to the court concerning the matter of fact, in any case civil or criminal, committed by the court to their trial and examination.

General VERDICT, is that which is brought into the court in like general terms as the general issue, as, in an action of disseisin, the defendant pleads no wrong, no disseisin. Then the issue is general, whether the fact be wrong or not, which being committed to the jury, they, upon consideration of the evidence, come in and say, either for the plaintiff, that it is a wrong disseisin; or, for the defendant, that it is no wrong disseisin.

Special VERDICT, is when they say at large, that such and such a thing they found to be done by the defendant or tenant; declaring the course of the fact, as in their opinion it is proved; and, as to the law upon the fact, praying the judgment of the court.

This special verdict, if it contain an ample declaration of the cause from the beginning to the end, is called a verdict at large.

VERDITER, or VERDETER, a factitious substance, prepared by casting wine or water upon the new copper, just as it comes red-hot out of the furnace, and catching the steams which rise from it upon copper-plates.

VERDOY, in heraldry, is applied to a bordure of a coat of arms, charged with any kinds or parts of flowers, fruits, seeds, plants, &c.

VERDURE, the quality of greenness.

VERGE, is used for the compass or extent of the king's-court, within which is bounded the jurisdiction of the lord steward of the king's houshold.

Court of VERGE, is a court or tribunal in manner of a king's-bench, which takes cognizance of all crimes and misdemeanours committed within the verge or jurisdiction of the king's court.

VERGILIÆ, a constellation whose appearance denotes the approach of the spring.

VERJUICE, a juice or liquor drawn from sour grapes, or apples, unfit for wine or cyder; or from sweet ones, while yet acid and unripe.

Verjuice is made of crabs, gathered and laid to sweat in a heap, the stalks, &c. separated; then stamped or ground, and the crab-mash put in a hair-bag; the juice squeezed in a press barrelled up close, and set in a warm place to work for 10 or 12 days.

VERMICELLI, or VERMICHELLI, a kind of mixture, prepared of flour, cheese, yolks of eggs, sugar, and saffron; and reduced into little long pieces, or threads like worms, by forcing it with a piston through a number of little holes in the end of a pipe made for the purpose.

VERMICULAR, an epithet given to any thing that bears a relation or resemblance to worms, vermiculi.

The vermicular or peristaltick motion of the intestines is performed by the contraction of the fibres thereof, from above downward; as the antiperistaltick motion is by their contraction from below upwards.

VERMIFORMIS, in anatomy, a term applied to various parts in the human body, bearing some resemblance to worms.

VERMIFUGUS, a remedy against worms.

VERMILLION, a very bright and beautiful red colour, in great esteem among the ancients, under the name of minium. There are two kinds of it, the one natural,

natural, the other factitious. The natural is found in fome filver mines in the form of a ruddy fand, which is afterwards prepared and purified by feveral lotions and coctions. The artificial is made of mineral cinnabar, ground up with aqua-vitæ and urine, and afterwards dried.

VERMIN, *Vermina*, a collective name including all kinds of little animals, or infects, which are hurtful or troublefome to men, beafts, fruits, &c. as worms, lice, fleas, caterpillars, ants, flies, &c.

VERMIVOROUS *Animals*, are fuch as feed upon worms.

VERNACULAR, is applied to any thing that is peculiar to fome one country.

VERNAL, fomething belonging to the fpring feafon.

VERNAL *Signs*, are thofe which the fun is in during the fpring feafon, viz. Aries, Taurus, and Gemini.

VERNAL *Equinox*, is that which happens when the fun is afcending from the equator towards the north pole.

VERNIER, or NONIUS, among mathematicians, a fcale of divifions ferving to cut the divifions of an arch into fingle minutes.

VERONICA, in botany, a genus of the decandria-monogynia clafs of plants, the corolla whereof confifts of a fingle petal; the tube is nearly of the length of the cup; the limb is plain, and divided into four parts; the fegments are oval, and the lower one is narrower than any of the reft; the fegment over-againft it, is broader than any; the fruit is a capfule of a turbinated cordated figure, with a compreffed apex, it is compofed of four valves, and contains two cells, in each whereof are numerous roundifh feeds.

Among the fpecies of this genus, are the common fpeedwell, the brooklime, and the wild germander.

Thefe, and feveral other fpecies of this genus, are famous in medicine; the common fpeedwell is a good antifcorbutick, and has lately been celebrated in the gout and rheumatifm. The water-brooklime is alfo one of the antifcorbuticks of the fhops, and its juice is alfo made a part of the fpring juices given againft thofe complaints.

VERSE, *Verfus*, in poetry, a line or part of a difcourfe confifting of a certain number of long and fhort fyllables, which run with an agreeable cadence; the like being alfo reiterated in the courfe of the piece.

Verfes are of various kinds; fome denominated from the number of feet whereof they are compofed, as the monometer, dimeter, trimeter, tetrameter, pentameter, hexameter, hendecafyllabum, &c. Some from the kinds of feet ufed in them; as the pyrrhichian, proceleufmatick, iambick, trochaick, dactylick, anapæftick, fpondaick, or moloffean, chor-iambick, iambo-dactylick, or dactylo-trochaick. Sometimes from the names of the inventors, or the authors who have ufed them with moft fuccefs; as the anacreontick, archilochian, hipponactick, pherecratian, glyconian, alcmenian, æfclepiadean, alcaick, ftefichorean, phalifcan, ariftophanian, callimachian, galliambick, phalæcian, and fapphick. Sometimes from the fubject, or the circumftances of the compofition; as the heroick, elegiack, adonick, &c.*

Equivocal VERSES, thofe where the fame words contained in two lines carry a different fenfe.

Reciprocal VERSES, thofe which read the fame backwards as forwards.

VERSED *Sine of an Arch*, called by the ancients Sagitta, is that part of the radius contained between the fine and the arch.

VERSIFICATION, the art or manner of making verfe; alfo the tune and cadence of verfe.

Verfification is properly applied to what the poet does more by labour, art, and rule, than by invention, and the genius of furor poeticus.

VERSION, a tranflation of fome book or writing out of one language into another.

VERT, in heraldry, the term for a green colour.

It is called vert in the blazon of the coats of all under the degrees of nobles; but in thefe it is called emerald, and, in thofe of kings, Venus. In engraving it is expreffed by diagonals or lines drawn athwart, from right to left, from the dexter chief corner to the finifter bafe.

VERT, or green hue, in foreft law, any thing that grows and bears a green leaf within the foreft that may cover a deer.

VERTEBRÆ, a chain of little bones reaching from the top of the neck down the back to the os facrum, and forming a third part of the human fkeleton called the fpina dorfi. The vertebræ are 24 in number; feven of them belong to the neck, 12 to the back, and five to the loins, &c. They lie in a ftraight line, thofe of the neck bend inward, and thofe of the back outwards, for enlarging the cavity of the thorax; and thofe again of the loins bend inwards, and thofe of the os facrum outwards, to enlarge the cavity of the bafon.

VERTEBRALES, in anatomy, a pair of mufcles, whofe office it is to ftretch out all the vertebræ of the back.

VERTEX is the crown of the head, fituate between the finciput and occiput; hence, alfo, figuratively, it is ufed for the top of any thing.

VERTEX *of an Angle*, is the angular point, or the point wherein the legs meet.

VERTEX *of a Figure*, is the vertex of an angle oppofite to the bafe.

VERTEX *of a Curve*, is the point from which the diameter is drawn; or the interfection of the diameter and the curve.

VERTEX *of a Glafs*, in opticks, the fame with the pole thereof.

VERTEX is alfo ufed, in aftronomy, for the point of heaven perpendicularly over our heads, properly called the zenith.

Path of the VERTEX, the circle defcribed by the vertical point during one revolution of the earth about its axis.

VERTICAL CIRCLE, in aftronomy, a great circle of the fphere paffing through the zenith and nadir, and cutting the horizon at right angles. It is otherwife called azimuth. See AZIMUTH.

Prime VERTICAL, is that vertical circle or azimuth which paffes through the poles of the meridian; or which is perpendicular to the meridian, and paffes through the equinoctial points.

VERTICAL *of the Sun*, is the vertical which paffes through the centre of the fun at any moment of time.

VERTICAL *Plane*, in perfpective, is a plane perpendicular to the geometrical plane, paffing through the eye, and cutting the perfpective plane at right angles.

VERTICAL *Plane*, in conicks, is a plane paffing through the vertex of the cone, and parallel to any conick fection.

VERTICAL *Line*, in conicks, is a right line drawn on the vertical plane, and paffing through the vertex of the cone.

VERTICAL *Dial*, is a fun-dial drawn on the plane of a vertical circle, or perpendicular to the horizon.

VERTICAL *Point*, in aftronomy, the fame with vertex or zenith.

VERTICILLATE PLANTS, are fuch as have their flowers intermixed with fmall leaves growing in a kind of whirls about the joints of a ftalk; as penny-royal, horehound, &c.

VERTICITY, is that property of the load-ftone whereby it turns or directs itfelf to fome peculiar point.

VERTIGO, in medicine, a difeafe in which the head feems to turn round.

With refpect to the cure, the regimen, in general, ought to be the fame with that in the apoplexy or epilepfy. If the patient is plethorick, a due quantity of blood is to be taken away; and if a naufea, lofs of appetite, or any other diforder of the ftomach remain, an emetick is to be prefcribed; then cathartticks and fpecificks are to be ordered. According to Mayerne, calamus aromaticus, in whatever form, is good for a vertigo, and efteemed a fecret for that diforder. The fame author informs us, that a German phyfician cured a great many vertigoes, by pills made of fugar of lead and cyprefs turpentine; four or five grains of which were to be taken for a dofe, and their ufe perfifted in for fome days. Gliffon, as Bates informs us, after all other medicines had failed, was cured of a fevere vertigo, of three weeks continuance, by fhaving his head, and applying to it a

plaifter of the flowers of fulphur and whites of eggs. Some order a cauftick, or a feton, to be applied to the back part of the neck; a cautery to the bregma, and Bates's epileptick electuary, or Fuller's Peruvian epileptick electuary, to be ufed internally.

Willis informs us, that after he had in vain tried all other medicines, he, with fuccefs, prefcribed the following powder: take of the powder of the roots of male piony, two ounces; of the flowers of male piony, one ounce; of peacock's dung, of the whitifh kind, half a pound; and of white fugar, two ounces: reduce to a powder, the dofe of which is to be about the quantity of a fpoonful twice a day, drinking after it a draught of a decoction of fage and rofemary, impregnated with coffee.

VERU-MONTANUM, in anatomy, a kind of little valve, in the place wherein the ejaculatory ducts enter the urethra. Its ufe is to prevent the urine, in paffing the urethra, from getting in at thefe ducts, and fo mixing with the femen.

VESICA, in anatomy, a bladder, a membranous or fkinny part in which any humour is contained.

VESICATORY, *Vcficatorium*, an external medicine, ferving to raife a blifter; whence, alfo, it is itfelf, though improperly, called a blifter.

VESICULA, *Veficle*, a dimunitive of vefica, fignifying a little bladder. The lungs confift of veficulæ, or lobules of veficulæ, admitting air from the bronchiæ; and not only air, but alfo duft, &c. There are feveral parts of the body which bear this appellation.

VESICULA, *Fellis*, ciftula fellis, or the gall-bladder, which is an oblong membranous veffel, not unlike a pear both in form and fize; fituate in the hollow part of the liver. It adheres to the liver, not only by its veffels, which it receives from it, but, likewife, by its membranes, whereof the external is common to both. The lower part, which hangs out of the liver, refts on the pylorus of the ftomach. The ufe of the gall-bladder is to receive the bile after its being fecreted in the glands of the liver, and to difcharge it by the common duct into the duodennum. The bile, found in this veffel, is of a brighter yellow, a greater confiftence, and more bitter and acrimonious than that of the porus bilarius.

VESPER, in aftronomy, called, alfo, hefperus, and the evening ftar, is the planet Venus, when fhe is eaftward of the fun, and, confequently, fets after him.

VESPERS, in the Romifh church, evening fong, that part of the office that is rehearfed after noon—anfwering to our evening prayers; except that it differs more from the office of the morning, called mattins.

VESPERTILIONUM *Alæ*, bat's wings, among anatomifts, two broad membranous ligaments with which the bottom of the womb is tied to the bones of the ilium; fo called from their refembling a bat's wings.

VESPERTINE, *Vefpertinus*, in aftronomy, is when a planet is feen defcending to the weft after fun-fet.

VESSEL, *Vas*, *Vafe*, a thing proper to hold or contain liquor.

VESSEL, in navigation, is a name common to all forts of fhipping, i. e. all floating machines or vehicles that move in the water. Veffels are diftinguifhed in many claffes, according to their magnitude, fhape, and ufe. The figure of veffels is a thing of great importance with regard to their motion, failing, &c. and in determining what form is moft commodious for the intent of the veffel.

VESTALIA, feafts held in honour of the goddefs Vefta, on the fifth of the ides of June, i. e. on the ninth day of that month.

VESTALS, in antiquity, maids, in ancient Rome, confecrated to the fervice of the goddefs Vefta; and particularly to watch the facred fire in her temple.

VESTIARIUS, *Veftiary*, in antiquity, mafter of the wardrobe; an officer under the Greek empire, who had the care and direction of the emperor's apparel, robes, &c.

VESTIBLE, *Veftibulum*, in the ancient architecture, a large open fpace before the door or entrance of a houfe.

VESTIBLE, *Veftibulum*, in anatomy, denotes the fore part of the labyrinth of the ear. See EAR.

VESTIGA, a Latin term, frequently ufed, by Englifh writers, to fignify the traces or footfteps any thing has left behind it.

VESTRY, *Veftriaria*, a room adjoining to a church, where the priefts veftments, and facred utenfils, are kept, and parochial affemblies held.

VESTRY-*Men*, a felect number of the principal perfons of every parifh within the city of London and elfewhere, who yearly chofe parifh officers, and take care of its concernments. They are thus called, as ufually meeting in the veftry of the church.

VESTRY-*Clerk*, a perfon who keeps the parifh accounts.

Bitter-VETCH. See ERVUM.

VETERAN, *Veteranus*, in the Roman militia, a foldier who was grown old in the fervice, or who had made a certain number of campaigns, and, on that account, was intitled to certain benefits and privileges.

Twenty years fervice were fufficient to intitle a man to the benefit of a veteran. Thefe privileges confifted in being abfolved from the military oath, in being exempted from all the functions of a foldier, in enjoying a certain falary or appointment, &c.

VETERIANUS, a farrier or horfe-leech.

VETERNUS, is ufed by fome phyficians for a lethargy, or other drowfy difeafe.

VETITUM NAMIUM, in law, imports a forbidden diftrefs; fuch, e. gr. is, that when the bailiff of a lord diftrains beafts or goods, and the lord forbids his bailiff to deliver them when the fheriff comes to replevy them, and to that end drives them to places unknown.

VIA-LACTEA, in aftronomy, the milky way, or galaxy.

VIA-*Solis*, the fun's way, in aftronomy, is ufed, among fome aftronomers, for the ecliptick line, fo called becaufe the fun never goes out of it.

VIÆ-*Primæ*, firft paffages, among phyficians, are the œfophagus, ftomach, and guts; including the whole length of the alimentary duct, or canal, from the mouth of the fphincter ani.

VIALES, in mythology, a name given among the Romans to the gods who had the care and guard of the roads and highways.

VIATOR, in antiquity, an officer of juftice among the Romans. The term, originally, had no other fignification than that of a publick meffenger, or fervant, fent to advertife the fenators, or magiftrates, when affemblies were to be held where their prefence was required. In procefs of time, the name Viator became common to all officers of the magiftrates lictors, accenfi, fcribes, ftatores, and cryers.

VIBEX, is fometimes ufed, by phyficians, for a black and blue fpot in the fkin, occafioned by an afflux or extravafation of blood.

VIBRATION, in mechanicks, a regular, reciprocal motion of a body, as a pendulum, &c. which, being freely fufpended, fwings or ofcillates, firft this way, then that. See PENDULUM.

VIBRATION, is alfo ufed, in phyficks, for divers other regular alternate motions. Senfation is fuppofed to be performed by means of the vibratory motion of the nerves, begun by external objects, and propagated to the brain.

VICAR, *Vicarius*, a perfon appointed, as deputy of another, to perform his functions in his abfence, and under his authority.

VICAR, in the common law, denotes a prieft of a parifh, the predial tithes whereof are impropriated or appropriated; that is, belonging either to a chapter, religious houfe, &c. or to a layman, who receives them, and only allows the vicar the fmall tithes or a convenient falary, anciently called portio congrua.

VICAR-*General*, was a title given by king Henry VIII. to Thomas Cromwell, earl of Effex, with full power to overfee the clergy, and regulate all matters relating to church affairs.

VICE, *Vitium*, in ethicks, is ordinarily defined an elective habit, deviating, either in excefs, or defect, from the juft medium wherein virtue is placed.

VICE, in fmithery, and other arts employed in metals, is a machine, or inftrument, ferving to hold faft any thing they are at work upon, whether it be to be filed, bent, rivetted, &c. To file fquare, it is abfolutely neceffary, the vice be placed perpendicular with its chaps parallel to the work-bench.

Hand VICE, is a fmall kind of vice ferving to hold the leffer works in, that require often turning about.

Of thefe there are two kinds, the broad-chapped hand vice, which is that commonly ufed; and the fquare-nofed hand vice, feldom ufed but for filing fmall round work.

Vice, is alfo a machine ufed by the glaziers to turn or draw lead into flat rods, with grooves on each fide to receive the edges of the glafs.

Vice-*Admiral*, is an officer in the navy, next in rank to an admiral, who takes place according to feniority, and is denominated from the colour of his flag, which is either red, white, or blue, and which he hoifts at the fore-top-maft head.

Vice-*Chamberlain*, alfo called, in ancient ftatutes, under chamberlain, is an officer in the court next under the lord chamberlain; and, in his abfence, has command and controul of all officers belonging to that part of the houfhold, called the chamber above ftairs.

Vice-*Chancellor of an Univerfity*, is an eminent member, chofe annually to manage affairs in the abfence of the chancellor.

Vice-*Dominus Epifcopi*, in the cannon law, is the commiffary, or vicar-general of a bifhop.

Vice-gerent, *Vicegerens*, a vicar, deputy, or lieutenant.

Vice-Roy, a governor of a kingdom, who commands therein in the name and ftead of a king, with full and fovereign authority.

Vice *Verfa*, a Latin phrafe, frequently retained in Englifh writings, fignifying as much as, on the contrary. Thus, as the fun mounts higher and higher above the horizon, infenfible perfpiration increafes, and, vice verfa, as he defcends lower, it diminifhes.

VICENNALIS, in antiquity, fomething of 20 years, or that returns after 20 years.

VICISSITUDE, *Viciffitudo*, the fucceeding of one thing after another; as the viciffitude of feafons, fortune, &c.

VICOUNT, *Vice-comes*, in our law-books, fignifies the fame with fheriff; between which two words there feems to be no other difference, but that the one came from our conquerors, the Normans; the other from our anceftors, the Saxons.

Vicount, or Viscount, is alfo ufed for a degree of nobility next below a count or earl, and above a baron.

VICOUNTIELS, *Vicontiels*, *Vicecomitalia*, in our law-books, denotes things belonging to the fheriff, particularly certain farms, for which the fheriff pays a rent to the king, and makes what profit he can of them.

Writs Vicountiel, are fuch as are triable in the county or fheriff's court. Of which kind are divers writs of nuifance, &c.

Vicountiel *Jurifdiction*, is that jurifdiction belonging to the officers of the county; as fheriffs, coroners, efcheators.

VICTIM, *Victima*, a bloody facrifice, offered to fome deity, of a living thing, either a perfon or a beaft, which is flain to appeafe his wrath, or to obtain fome favour.

VICTIMARIUS, a minifter or fervant of the prieft, whofe office was to bind the victims, and to prepare the water, knife, cake, and other things neceffary for the facrifice.

VICTORY, *Victoria*, the overthrow or defeat of an enemy at war, combat, duel, or the like.

VICTUALLING-Office, an office kept on Tower-hill for the furnifhing his majefty's navy with victuals. It is managed by feven commiffioners, who have their inferior officers; as fecretaries, clerks, &c. befides agents in divers parts of Great-Britain, Ireland, &c.

VICTUS-Ratio, among phyficians, a particular manner of living for the prefervation of health, and prevention of difeafes.

VIEWERS, or Vejors, in law, are perfons fent by a court to view a place or perfon in queftion; as the fituation of a place where a fact was committed; or a perfon, in cafe of ficknefs.

VIGIL, or eve, in church chronology, the day before any feaft. Though the civil day begin at midnight, yet the ecclefiaftical or fcriptural day begins at fix o'clock in the evening, and holds to the fame time next evening.

VIGILIA, that ftate of an animal which is oppofite to fleep, and popularly called waking, or watching.

VILLAGE, *Villa*, or *Vill*, an affemblage of houfes inhabited chiefly by peafants and farmers, having ufually a church, but no market.

VILLAINOUS *Judgment*, is that which cafts the reproach and ftain of villainy and fhame on him againft whom it is given.

VILLI, coarfe hair, in anatomy, is ufed in the fame fenfe as fibres, or fibrillæ.

Villi, in botany, denotes a fort of tomentun, or down, like the grain or fhag of plufh; with which, as a kind of excrefcence, fome trees do abound.

VILLOUS, *Villofa*, is particularly applied to one of the coats or membranes of the ftomach, called crufta villofa. It takes its name from innumerable villi, or fine fibrillæ, wherewith its inner furface is covered.

VINCULUM, in algebra, a character in form of a line, or ftroke, drawn over a factor, divifor, or dividend, when compounded of feveral letters or quantities, to connect them, and fhew they are to be multiplied, or divided, &c. together by the other term. Thus, $d \times \overline{a+b-c}$ fhews that d is to be multiplied into $a+b-c$.

VINDEMIATING, the gathering of the grapes, or other ripe fruits, as the apples, peas, cherries, &c.

VINDEMIATRIX, or Vindemiator, a fixed ftar of the third magnitude in the conftellation Virgo, whofe latitude is 16° 12′ 34″ north, and longitude 5° 37′ 40″ of Libra, according to Mr. Flamftead's catalogue.

VINDICATION, claiming, in the civil law, an action arifing from the property a perfon has in any thing, or a permiffion to take or feize a thing, as one's own, out of the hands of a perfon whom the law has doomed not to be the true proprietor.

VINE, *Vitis*, a noble plant or fhrub of the creeping kind, famous for its fruit, or grapes, and for the liquor they afford. Our gardeners find, that vines are capable of being cultivated in England, fo as to produce large quantities of grapes; and thofe ripened to fuch a degree, as may afford a good fubftantial vinous juice. Witnefs the vineyards in Somerfetfhire, particularly that famous one at Bath. In effect, it does not feem fo much owing to the inclemency of our Englifh air, that our grapes are generally inferior to thofe of France, as to the want of a juft culture.

Thofe fitted for the Englifh climate Mr. Mortimer finds to be the black grape, and white mufcadine, parfley grape, mufcadilla, white and red Frontiniack. Mr. Bradley recommends the July grape, the early fweet water grape, lately brought from the Canaries, and the Arbois, or French fweet water grape: all which, if well managed, and the weather favourable, are ripe by the middle of Auguft. He alfo recommends the claret and Burgundy grapes. The beft foil for vines, according to Mortimer, is the hotteft gravel, fand, or dry rocky ground, provided it be well watered and fhaded. At firft planting, Mr. Bradley recommends chalky hills, as proper for vines. To mend a foil that wants thofe qualities, it is good to throw in the rubbifh of old buildings, well mixed with twice as much earth, and fifted about the roots of the vines. Vines are propagated either by layers, or cuttings; that is, either by laying down young branches, as foon as the fruit is gathered, or by making plantations of flips, or cuttings, at that time. Mr. Mortimer fays, it may be done any time in the winter before January; though Bradley fays, he has done it, with fuccefs, in March and April.

VINEGAR, *Acetum*, an agreeable acid penetrating liquor, prepared from wine, cyder, &c. by fermenting it a fecond time.

Method of making Vinegar *from the Refufe of Fruits*, &c. Take the fkins of raifins, after they have been ufed in making wine; and pour three or four times their own quantity of boiling water upon them, fo as to make a thin aqueous mixture. Then fet the containing cafk, loofely covered, in a warmer place than is ufed for vinous fermentation; and the liquor, in a few weeks time, will become a clear and found vinegar; which being drawn off from its fediment, and preferved in another cafk, well ftopped down, will continue perfect, and fit for ufe.

This experiment fhews us a cheap and ready way of making vinegar from refufe materials; fuch as the hufks of grapes, decayed raifins, the lees of wine, grounds of ale, beer, &c. which are frequently thrown away as ufelefs. Thus, in many wine countries, the marck, rape, or dry preffing of grapes, are thrown in heaps, and fuffered to putrify unregarded, though capable of affording as good vinegar as the vine itfelf. In fome places they bury copper-plates in thefe hufks, in order to make verdigreafe; but this practice feems chiefly confined to the fouthern parts of France. Our prefent experiment fhews

us how to convert them to another uſe; and the direction extends to all the matters that have once undergone, or are fit to undergo, a vinous fermentation, for that all ſuch matters will afford vinegar. Thus all our ſummer-fruits in England, even black-berries; all the refuſe waſhings of a ſugar-houſe, cyder-preſſings, or the like, will make vinegar, by means of water, the open air, and warmth.

The whole proceſs whereby this change is effected, deſerves to be attentively conſidered. And firſt, the liquor to be thus changed, being kept warmer than in vinous fermentation, it, in a few days, begins to grow thick, or turbid; and without throwing up bubbles, or making any conſiderable tumult, as happens in vinous fermentation, depoſits a copious ſediment. The effect of this ſeparation begins to appear firſt on the ſurface of the liquor, which gathers a white ſkin, that daily increaſes in thickneſs, till at length it becomes like leather; and now, if continued longer in this ſtate, the ſkin turns blue or green, and would at laſt grow ſolid, and putrify: therefore, in keeping down this ſkin as it grows, and thruſting it gently down to the bottom of the veſſel, conſiſts much of the art of vinegar-making, eſpecially from malt.

It is to be particularly obſerved, that if wine were not bunged down, when arrived at its vinous ſtate, but ſuffered ſtill to remain open and expoſed to a warm air, it would ſpontaneouſly become vinegar; and the ſooner, if a ſomewhat greater degree of heat than ſerved for the making of wine, were employed. Whence we might have uſed wine for this purpoſe, as well as have added water to the huſks and ſediment, or lees; but we choſe the latter way, to ſhew that every ſuch refuſe matter will afford vinegar; and again, to intimate how far the art of vinegar-making may be ſtill improved, both in England, where they brew a wort from malt, and in ſome wine countries, where they make their beſt wines into vinegars.

What we would chiefly obſerve for the preſent, is, that acetous fermentation requires a ſtronger heat than the vinous; and that wines having once finiſhed their fermentation, as wines, do not naturally ſtop there; but, unleſs prevented, by the care of the operator, proceed directly on to vinegars; where again they make no ſtop, but unleſs prevented, go on ſpontaneouſly to vapidity, ropineſs, mouldineſs, and putrefaction. From which larger obſervation we would deduce this axiom, that, to ſpeak philoſophically, the intention, or tendency, of nature is to proceed from the very beginning of vinous fermentation directly, in one continued ſeries, to putrefaction, and thence again, to a new generation; which appears to be the grand circle wherein all natural things are moved; and all the phyſical, or rather chemical, phænomena of the globe are moved.

And hence we ſee, by the interpoſition of man, how this general proceſs of nature may be ſtopped at different times, with different views; ſo as to procure to ourſelves wines, vinegars, &c.

VINEYARD, a plantation of wines. The beſt ſituation of a vineyard is on the declivity of an hill lying to the ſouth. See VINE.

VINOUS, *Vinoſus*, ſomething that relates to wine, or has the taſte and ſmell thereof.

All vegetables, by a due treatment, afford a vinous liquor; as corn, pulſe, nuts, apples, grapes, &c.

VINTAGE, the crop of wine, or what is got from the vines each ſeaſon. The word is alſo uſed for the time and ſeaſon of gathering or preſſing the grapes.

VINUM, a liquor or drink properly called wine.

VINUM *Aromaticum*, made by infuſing aromaticks or ſpices in new wine or muſt.

VINUM *Cydonitis*, quince wine, made of the ſlices of that fruit ſteeped in muſt or new wine.

VINUM *Emeticum*, emetick wine, is wine wherein the glaſs or regulus of antimony, or crocus metallorum, has been ſteeped. It only takes a certain degree of efficacy from the matters; nor is it found any ſtronger at three months end, than at the end of eight days. It purges both upwards and downwards.

VINUM *Hippocratium*, or *Hippocras*, ſo called of manica Hippocrates, or Hippocrates's ſleeve, through which it is ſtrained, is a ſort of ſpiced wine in which ſugar and ſpices have for ſome time been ſteeped.

VINUM *Marinum*, a wine made by caſting ſea water on the grapes in the vat.

VINUM *Piccatum*, pitched wine, made of pitch infuſed in muſt.

VINUM *Roſatum*, roſe wine, made by ſteeping roſes three months in wine.

VIOL, *Viola*, a muſical inſtrument of the ſame form with a violin, and ſtruck like that with a bow.

VIOL is a term, uſed among mariners, for a piece of hawſer, the two ends of which are ſpliced, and being wound round the capſtan, is uſed to weigh the anchor.

VIOLATION, the act of violating, forcing a woman, or committing a rape upon her.

VIOLATION, is alſo uſed, in a moral ſenſe, for a breach or infringement of a law, ordinance, or the like.

VIOLENT, in the ſchools, a thing done by force: in which ſenſe it ſtands oppoſed to ſpontaneous.

VIOLIN, *Violino*, or fiddle, a muſical inſtrument, mounted with four ſtrings or guts, and ſtruck or played with a bow.

VIPER, a ſpecies of ſerpent, common to moſt parts of the world.

The viper is by far the moſt noxious animal of the ſerpent kind, that our part of the world affords; and it is as much the moſt uſeful in medicine. Indeed, balancing the good we receive from it, and the miſchief known to be done by it, it ſeems far more our intereſt that ſuch a creature ſhould be among us.

The viper is of the number of viviparous ſerpents, according to the common diſtinction; not laying its eggs in a dunghill or other warm places, as the common ſerpent and moſt others do, but retaining them in its body till hatched, and excluding the living young ones. Its food is principally of the animal kind; there are authors who talk of its eating of herbs, but on diſſecting vipers, there are generally found in their ſtomach the wings of beetles, the leg bones of mice, and ſometimes whole mice, frogs, and other animals of the like ſize; which, conſidering the natural ſmallneſs not only of the throat, but of the whole neck of the viper, it is amazing to conceive in what manner it goes down. The method indeed is by ſuction, and is very ſlow; the creature's body being drawn out into the utmoſt poſſible thinneſs, and the viper's neck diſtending gradually at the ſame time, till between both it is managed. What greatly facilitates this to the viper and to all the ſerpent kind, for it is common to them all, is that there is no danger of ſuffocation for want of breath from it, though the whole cavity of the throat be filled up; for, though theſe creatures have lungs and reſpiration, yet it is not of the nature of ours, or of that of quadrupeds; they are not under a neceſſity of taking in and diſcharging a quantity of air, at quick intervals, as we are; but what they have once taken in they retain a long while, ſo that they are under no neceſſity of breathing under this operation, which is therefore not painful to them, as we might naturally imagine, but pleaſant.

It is not eaſy to ſee the viper thus employed, becauſe, after taken, it will ſcarce be brought to eat at all; we have indeed no inſtance of any thing of the ſerpent kind eating while in confinement, except a female viper big with young; and, if poſſeſſed of ſuch a one, it may be poſſible to be a witneſs to it, and to the ſtrange terror of any little animal proper for its preying on, on being thrown into its way. Whoever has an opportunity of throwing a mouſe to a viper in this condition, will ſee how much foundation there is for the ſtories of the rattle-ſnake, and other ſerpents, enchanting, as it is called, the creatures they are to prey upon, into their mouths.

The viper is common in England, but much more ſo in warmer countries, and there more miſchievous. We may find vipers, in the heat of the day, on the dry banks under hedges expoſed to the ſun, and in places not too much frequented, almoſt at any time in the hotter months: In winter they retire into holes, and lie torpid the whole cold ſeaſon. However miſchievous the bite of the viper is, its fleſh is ſafe and wholeſome; indeed, there is no part of it will do any harm, except the poiſon lodged in the wound made by the bite: this very poiſon, ſeparated from the bag, diluted with any liquor, and ſwallowed, not being capable of producing any bad conſequence. The bite is attended with very terrible ſymptoms, and in the hotter countries is often fatal; with us many have

efcaped with life, without the affiftance of medicines, fome in fpite of bad management; we have lately had the remedy of the people who deal in them, and muft be often bit by them, explained to us. It is no more than common oil, which is to be rubbed on the wounded part over fome hot coals, and repeated occafionally. With the affiftance of this we have feen people efcape after very terrible fymptoms, fuch as perhaps we have not had an opportunity of feeing any body under, who did not ufe the fame means for relief. Other more painful methods have been prefcribed, but they are now wholly out of ufe. Thefe were the making ftrong ligatures on the limb above the wound, then fcarifying and burning it with an hot iron, or making a large incifion and filling it with gunpowder, and fetting them on fire.

Vipers are beft taken for medicinal ufe in the months of July and Auguft; they are then moft vigorous and fatteft, though thofe which are taken in fpring, as foon as they come out of their winter's torpid ftate, are always found to be in very good cafe: they are beft for ufe, when firft taken.

Vipers are to be chofen large and vigorous; if intended for ufe, while frefh, they fhould be killed immediately before the time, for their flefh corrupts very foon. If for drying, they fhould be killed at home, and, after fkinning, hung up.

Vipers diftilled in a retort, yield firft a moderate quantity of a limpid phlegm, infipid, and with very little fmell; after this comes over a phlegm loaded with volatile falt, and a fmall quantity of a black and extremely fœtid oil; a large quantity of volatile falt in the mean time concreting and fixing itfelf in a dry form to the fides of the receiver.

VIRGA, is particularly ufed in law for a verge or rod, fuch as fheriffs and bailiffs carry as a badge of their office.

VIRGÆ, in phyfiology, a meteor called alfo columellæ and funes tentorii; being an affemblage of feveral ftreams of light reprefenting a bundle of rods or ropes.

It is fuppofed owing to the ftreaming of the fun-beams through certain rimulæ or chinks, at leaft, through the more lax and open parts of a watry cloud; happening chiefly in the morning and evening.

VIRGIN. See VIRGINITY.

VIRGIN *Wax*, is that which has never been wrought, but remains as it came out of the hive.

VIRGIN *Oil*, is what oozes fpontaneoufly from the olive, &c. without preffing.

VIRGIN *Gold*, is that metal fuch as it is got of the ore without any mixture or alloy, in which ftate it is fometimes fo foft that it will take the impreffion of a feal.

VIRGIN *Copper*, is a native copper found in the mine, and which has never been melted down.

VIRGIN *Quickfilver*, is that found perfectly formed and fluid in the veins of mines; or at leaft is got from the mineral earth by mere lotion without fire.

VIRGIN *Parchment*, is that made of the fkin of an abortive lamb or calf.

VIRGIN'*s Thread*, a fort of meteor that flies in the air like fmall untwifted filk, and which, falling upon the ground or upon plants, changes itfelf in a form like a fpider's web.

VIRGINEUS MORBUS, the virgin's difeafe, the green ficknefs or chlorofis.

VIRGINITY, *Virginitas*, the teft or criterion of a virgin, or that which intitles her to the denomination. The phyficians, both antient and modern, are exceedingly divided upon the fubject of virginity, fome holding that there are no certain marks or teftimonies thereof, and others, that there are. Mofes eftablifhed a teft that was to be conclufive among the Jews. The nuptial fheets, it feems, were to be viewed by the relations on both fides, and the maid's parents were to preferve them as a token of her virginity, to be produced in cafe her hufband fhould ever reproach her on that fcore. In cafe the token of virginity was not found thereon, fhe was to be ftoned to death at her father's door. This teft of virginity has occafioned abundance of fpeculation about the parts concerned; but the niceft enquiries cannot fettle any thing certain about them. Dr. Drake fays exprefly, that whatever might be expected among the Jews, there is not the fame reafon to expect thofe tokens of virginity in thefe countries; for, befides that the Hebrews married extremely young, as is the cuftom in all the eaftern countries, there are feveral circumftances which may here fruftrate fuch expectations, even in virgins not vitiated, either by any male contact, or any wantonnefs of their own. In effect, in thefe northern countries, the inclemency of the air expofes the fex to fuch checks of perfpiration, as gives a great turn to the courfe of the humours, and drives fo much humidity through the parts, as may extraordinarily fupple and relax thofe membranes from which the refiftance is expected, and from which, in hotter countries, it might more reafonably be depended on. What moft commonly paffes among us for a teft of virginity, is the hymen; and yet the moft curious among the anatomifts are greatly divided, not only about the figure, fubftance, place, and perforations of this membrane, but even about the exiftence thereof; fome pofitively affirming, and others as flatly denying it.

VIRGO, ♍, in aftronomy, one of the figns or conftellations of the zodiack, in which the fun enters in the middle of Auguft. The ftars in the conftellation Virgo, in Ptolemy's catalogue, are 32; in Tycho's 39; in the Britannick, 89. (See Plate IV. *fig.* 6.)

VIRGULA DIVINA, or *Baculus Divinatorius*, a forked branch in form of a Y, cut from a hazle-tree, by means of which fome pretend to difcover mines, fprings, &c. under ground. The method of ufing it is this; the perfon who carries it walking very flowly over the places where he fufpects mines or fprings, the effluvia exhaling from the metals, or vapours from the water, impregnating the wood, they tell us make it dip, or incline; which indicates there is either a mine or fpring near. Several authors have mentioned their virgula divina; but at prefent, the whole is called in queftion. Dr. Linden, in his Three Letters on Mining, has given us a method of making an artificial divining rod, for difcovering lead mines.

VIRGULA, in grammar, a term which Latin, French, and fome other authors, ufe for a point in writing, ufually called by us, comma.

VIRILE, fomething that belongs or is peculiar to a man, or the male fex.

VIRILE *Age*, *Ætas Virilis*, is the ftrength and vigour of a man's age, viz. from 30 to 45 years, which is an age wherein we are equally removed from the extremes of youth and old age.

VIRTUAL, potential, fomething that has the power or virtue of acting or doing.

VIRTUAL *Focus*, in opticks, is a point from which rays before converging begin to diverge or divaricate.

VIRTUE, *Virtus*, a term ufed in various fignifications. In the general it denotes the power or perfection of any thing, whether natural or fupernatural, animate or inanimate, effential or acceffary. Hence the virtues, i. e. powers of God, angels, men, plants, elements, &c.

VIRTUE, in its more proper and reftrained fenfe, fignifies a habit which improves and perfects the poffeffor, and his actions. In this fenfe, virtue is a principle of acting or doing well and readily; and that either infufed from above, fuch as are the theological virtues; or acquired by our own application, as the intellectual and moral virtues.

Intellectual VIRTUE, according to Ariftotle, is a habit of the reafonable foul whereby it conceives and fpeaks the truth, either in affirming or denying.

Moral VIRTUE is defined by Ariftotle to be an elective habit placed in a mediocrity, determined by reafon and as a prudent man would determine.

VIRTUES, in the celeftial hierarchy, the third rank or choir of angels, being that in order between dominations and powers.

VIRTUOSO, an Italian term lately introduced into Englifh, fignifying a man of curiofity and learning; or one who loves and promotes the arts and fciences.

VIRULENT, a term applied to any thing that yields a virus, that is, a contagious or malignant pus.

VIS, a Latin word fignifying power; adopted by phyfical writers to exprefs divers kinds of natural powers or faculties.

VIS *Inertiæ*, or power of inactivity, is defined by Sir Ifaac Newton to be a power implanted in all matter whereby it refifts any change endeavoured to be made in its ftate, i. e. whereby it becomes difficult to alter its ftate either of reft or motion.

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This power then coincides with the vis reſiſtendi, power of reſiſting, whereby every body endeavours as much as it can to preſerve in its own ſtate, whether of reſt or uniform rectilinear motion; which power is ſtill proportional to the body, and only differs from the vis inertiæ of the maſs, in the manner of conveying it.

Bodies only exert this power in changes brought on their ſtate by ſome vis impreſſa, force impreſſed on them. And the exerciſe of this power is, in different reſpects, both reſiſtance and impetus; reſiſtance, as the body oppoſes a force impreſſed on it to change its ſtate; and impetus, as the ſame body endeavours to change the ſtate of the reſiſting obſtacle.

Vis *impreſſa*, is defined by Sir Iſaac Newton to be the action exerciſed in any body to change its ſtate, either of reſiſting or moving uniformly in a right line.

This force conſiſts altogether in the action, and has no place in the body after the action has ceaſed. For the body perſeveres in every new ſtate by the vis inertiæ alone.

VISCERA, in anatomy, a term of equal import with entrails, including the heart, liver, lungs, ſpleen, inteſtines, and other inward parts of the body.

VISCIDITY, or Viscosity, the quality of ſomething that is viſcid, or viſcous, i. e. glutinous, or ſticky; like bird-lime, which the Latins call by the name viſcus.

VISIBLE, *viſibile*, ſomething that is an object of ſight; or that reflects the rays of light to the organ of viſion.

VISIER, or Vizier, an officer or dignity in the Ottoman empire; whereof there are two kinds, the firſt called by the Turks Viſier azum, that is, grand Viſier, firſt created in 1370, by Amurath I. in order to eaſe himſelf of the chief and weightier concerns of the government.

VISION, *Viſio*, the act of ſeeing or perceiving external objects by the organ of ſight. See Eye.

Light, which is an aggregate of all colours collected together, ſends forth rays on all ſides: Theſe rays, though very ſubtle, are in like manner compounded of all kinds of colours; whence they are again diviſible into ſimple rays, which collected ſeparately, or of one ſort, or of different ſorts together, repreſent variety of colours; but all, united, form a very ſplendid, lucid beam, or very white brightneſs. Theſe rays proceed from a lucid point, as from a centre towards all points without it, in ſtrait lines, through an homogeneous medium, in a very ſmall ſpace of time, paſſing through a pellucid and falling upon opaque objects. Hence, all points of the cornea are ſtruck by rays contained within a cone whoſe vertex is the lucid point, and its baſe the plane of the cornea, if there be no impediment interpoſed between the radiating point and the cornea.

The ſame rays approaching denſer bodies, are there incurvated, ſome more, ſome leſs; hence they are ſeparated, and being ſeparated and reflected, exhibit variety of colours falſely aſcribed to the reflecting and refracting body, unleſs ſo far as they are ſeparated by its means; the reflection then is here various according to the variety of colour latent in the ray; the angle, however, which the reflected ray makes with a perpendicular erected at the place of incidence, ſeems to be the ſame as that made by the falling ray with the ſame perpendicular; and in other reſpects there ſeems to be no alteration at all.

If theſe rays paſs out of one medium into another, in their approach to the latter they are incurvated, and in that condition paſs on through that medium; and, the more denſe this is, the nearer incurvated are they towards a perpendicular, and ſo on the contrary, and the ſame is alſo owing to a ſingular cauſe latent in ſome fluids, and not to be determined but by experiments. This inclination is called refraction.

This refraction, with regard to ſenſe, is regulated by one certain law, which is as follows: If the ſame ray falls into the ſaid pellucid medium in variety of angles, the ſines of the angles of incidence will bear the ſame proportion to one another as the ſines of the refracted angles.

Hence it follows, that, rays proceed from a radiating or reflecting point to the pellucid cornea, and there refract towards a perpendicular with almoſt the ſame alteration in courſe as in water, ſo they paſs on through the aqueous humour, and have their courſe determined through the perforation of the pupil to the ſuperficies of the cryſtalline lens; but thoſe rays which enter with ſo great obliquity as to fall on the iris, are thence reflected and fall out of the eye again, that they might not by their reflection, and ingreſs into the eye, diſturb the diſtinctneſs of viſion; and thoſe other rays which, on account of their obliquity, fall between the lower part of the uvea and the vitreous body, or on the ſuperficies of the vitreous body, are immediately ſuffocated in the black pigment of the ſame, and loſt as if they had never been, that ſo no rays might be tranſmitted through the vitreous humour, but ſuch as, after penetrating the pupil, fall upon the cryſtalline lens; the iris, in the mean time, being contracted or dilated, admits more or fewer rays in proportion as the object is nearer, and more vivid, or more remote and languid; under this law or regulation, that, the nearer or more luminous the object, the narrower or more contracted the pupil. This happens from a mechaniſm peculiar to that part, and defends that very tender membrane, the retina, from being offended, dried, or ſcorched.

The flatter therefore the cornea, the leſs it collects the rays which fall upon it from one lucid point, and the more it diſperſes them, ſo that the fewer in number arrive at the cryſtalline lens, and even thoſe very divergent, unleſs they come from a very remote object; on the contrary, the rounder the figure of the cornea, the more it will unite the rays which ſtrike on it from one radiating point, and the greater number will it collect in the cryſtalline lens, and thoſe very different. And hence you may aſſign one reaſon for the viſion of ſhort-ſighted and aged perſons.

The cryſtalline lens, after receiving the determined rays from a pupil, unites them ſtill more by a new refraction, and renders them convergent under the following law, or regulation, that thoſe rays which proceed from one point without the eye, being here collected into one point not far remote, are thence conveyed through the vitreous humour to the retina, on which they paint only that one point preciſely from which thoſe rays proceed. If the cryſtalline lens be very denſe or round, the point of collection (the focus) is too near the lens, which creates confuſion; if on the other hand the lens be too rare or flat, the point of collection is too remote, whence a confuſion is again occaſioned; and this affords us another reaſon for the viſion of old perſons, and myopes, or ſuch as are ſhort-ſighted. From the two laſt paragraphs, we may account or aſſign the reaſon why ſhort-ſighted perſons have their ſight helped by a concave dioptrick glaſs, or moving the object nearer; and why aged perſons ſee more diſtinctly through a convex dioptrick glaſs, or when the object is more remote.

Both theſe defects in the perſons juſt mentioned are alſo remedied by bringing the cryſtalline lens to the cornea or removing it at a diſtance, which purpoſes ſeem to be anſwered two different ways; as by compreſſing the bulb of the eye by a ſtrong contraction of all the four muſcles at once, whence the bulb is lengthened; or by a contraction of the fibres which compreſs the vitreous body and elevate the lens. There appears no other method of anſwering theſe intentions.

The refraction which a ray ſuffers in paſſing out of the air into the cornea, is nearly equal to what it ſuffers in paſſing out of the air into water; and the refraction of a ray paſſing from the aqueous humour into the lens, is equal to what happens to a ray paſſing out of water into glaſs; whence the alteration is inconſiderable, and in the laſt place a ray paſſing from the cryſtalline lens to the vitreous body ſuffers but little alteration by refraction, and perhaps none at all, when the vitreous humour is pretty cloſely compreſſed; by which means that part becomes more denſe. Hence, the principal and moſt neceſſary uſe of the vitreous humour ſeems to be that the lens, by having free ſpace to move, might adjuſt and accommodate the eye to different diſtances, being itſelf a ſubſtance of a leſs mutable figure than the vitreous body.

The end or deſign of all this apparatus (of humours and refractions) is that there might be a diſtinct and vivid collection of thoſe rays which proceeding from one point of the object enter the eye, and penetrate the cryſtalline lens, in the bottom of the eye directly under the pupil, and that ſo there may be painted in this bottom as many points as were conſpicuous in the image. Hence, the picture or image in miniature, formed on the retina, reſembles the object.

And, ſince the mucous medulla of the optick nerve has its ſeat preciſely in this place, directly under the pupil and the lens, it appears that this is the part which receives the pictures, and by a continuation of the impreſſion pro-

presents them to the common censory, and excites in the mind the idea of the thing seen. It appears also from what has been said, that the experiment of Picard and Mariotte is so far from disproving what has been advanced in the preceding paragraphs, as some authors have thought, that it is a clear confirmation of it; and we have even occasion here given us to break forth in praise of infinite wisdom in placing the entrance of the optick nerve next the axis of vision, not towards the exterior angle of the eye, but towards the nose in the middle altitude.

The perfection therefore of vision depends on such a figure, transparency, fabrick, and energy of the solids, and such a denseness and transparency of the colourless humours as are qualified for collecting multitudes of rays from every visible point of an object, unmixed with others, upon one distinct point of the retina, this focus being formed neither too near nor remote; and, in the next place, on such a mobility of these solids and humours, in conjunction. as are necessary for a clear and distinct painting of objects placed at different distances; for which those requisites, their size, the figure, distance, situation, motion, rest, light, and colour, are very well represented. In the retina there is, besides, required such a situation, expansion, quickness of sense, tenderness, and justness of proportion between the medullary, arterial, venous, and lymphatick substance as dispose it for transmitting, by a free and sound optick nerve, pure and perfect images to the common sensory.

There is then no emanation of rays from us, nor are they reflected from objects back again upon us, as the stoicks asserted; nor is sight performed by emission of a visible species from the object towards us, as the Pythagoreans thought; nor by emission of effluvia from the object and the eye meeting together, and, after mutual embraces, reflected, as the Platonists, by an extraordinary way of ratiocination, endeavour to prove; nor, lastly, is it owing to a material emanation of corporeal images, as was the opinion of Epicurus; but is performed in that simple and mechanick way which we have above explained.

Queries on this subject are such as the following.

Why objects, placed at the least distance in which the eye can bear to see distinctly, affect us in a more languid manner? why also, when placed too near, they seem confused? what is necessary to a distinct, what to a strong vision? and the like, which are all easily answered from the premises. *Boerhaave Institut. Medic.*

Direct, or simple VISION, is that performed by means of direct rays; that is, of rays passing directly or in right lines from the radiant point to the eye.

Reflected VISION, is that performed by rays reflected from specula or mirrors.

Refracted VISION, is that performed by means of rays refracted or turned out of their way, by passing through mediums of different density, chiefly through glasses and lens's.

VISION, among divines, is used for an appearance which God occasionally sent his prophets and saints, either by way of dream or reality.

Beatifick VISION, denotes the act whereby the angels and blessed spirits see God in paradise.

VISITATION, *Visitatio*, an act of jurisdiction, whereby a superior, or proper officer, visits some corporation, college, church, or other publick or private house, to see that the laws and regulations thereof be duly observed.

VISNE, *Visnetum*, in law, a neighbouring place or place near at hand.

VISUAL, something belonging to the sight or seeing.

VISUAL *Rays*, are rays of light imagined to come from the object to the eye.

VISUAL *Point*, in perspective, is a point in the horizontal line wherein all the ocular rays unite.

Thus a person standing in a straight long gallery, and looking forwards, the sides, floor, and ceiling, seem to meet, and touch one another in a point or common centre.

VITAL, *Vitalis*, in anatomy, something that ministers principally to the constituting or maintaining of life in the bodies of animals. Thus, the heart, lungs, and brain, are called vital parts.

VITAL *Functions, or Actions*, are those operations of the vital parts whereby life is effected, so as that it cannot subsist without them.

2

VITAL *Spirits*, are the finest and most volatile parts of the blood.

VITRIFICATION, or VITRIFACTION, the act of converting a body into glass by means of fire.

Of all bodies, fern-ashes, sand, bricks, and pebbles, vitrify the most easily. Accordingly, it is of these that glass is principally made.

VITRIOL, in natural history, &c. a compound body formed of the particles of metals dissolved by the acid of sulphur, and that either by the operations of nature within the earth, or in the chymists elaboratory by proper admixtures and assistances, and afterwards, by the help of water, brought into the form of a salt.

The vitriols, therefore, very much approach the nature of metals, and, in some instances, are found to have taken up other substances, particularly, some of the semimetals among them, as, particularly, the white vitriol, which contains zink. The other metals we find dissolved in this manner in the bowels of the earth, and there formed into vitriols, are iron and copper. These, therefore, are the great basis of these salts, and according as they belong to one or the other of them, they are to be divided into the cupreous and ferrugineous vitriols. See COPPERAS.

VITRIOLATED, among chymists, turned into vitriol, or having vitriol infused into it.

VITRIOLICK, something that has the quality of vitriol, or partakes of the nature of vitriol.

VITRIOUS, or VITREOUS, in anatomy, the third or glassy humour of the eye, thus called, from its resemblance to melted glass.

VITTA, among anatomists, fillet, or head-band; is used for that part of the amnios, which sticks to the infant's head, when it is just born.

VIVA VOCE, q. d. as who should say by word of mouth.

VIVIFICATION, in medicine, the art of vivifying; that is, of contributing to the action that gives life, or maintains life.

The chymists also use the word in speaking of the new force, vigour, and lustre, which, by this art, they give to natural bodies; particularly to mercury, which, after having been fixed or amalgamated, they restore to its first state.

VIVIPAROUS, *Viviparus*, in natural history, an epithet applied to such animals as bring forth their young alive and perfect, in contradistinction to them that lay eggs, which are called oviparous animals.

VIVO, in architecture, the shaft or fust of a column.

The term is also used in a more particular sense for the naked of a column, or other part.

ULCER, *Ulcus*, in surgery, a solution of the soft parts of our bodies, together with the skin, produced by some internal cause, as an inflammation, abscess, or acrimonious humours. But wounds which become inveterate, and even contusions, when difficult of cure, come within this definition, and pass, at length, into ulcers, and are commonly called by that name.

ULCERATION, *Exulceratio*, a little aperture or hole in the skin caused by an ulcer.

ULIGINOUS, *Uliginosus*, implies as much as moist, moorish, fenny.

ULLAGE *of a Cask*, is that part of the cask which is empty.

ULTERIOR, in geography, is applied to some part of a country or province, which, with regard to the rest of that country, is situate on the further side of the river, mountain, or other boundary, which divides the country into two parts. Thus Africa, with regard to Europe, is divided by mount Atlas into citerior and ulterior, i. e. into two portions, the one on this side mount Atlas, and the other on that.

ULTRAMARINE, *Ultramarinum*, a beautiful blue colour used by the painters, prepared from lapis lazuli. See LAPIS LAZULI.

ULTRAMONTANE, something beyond the mountains.

The term is principally used in relation to Italy and France, which are separated by the mountains of the Alps.

ULTRAMUNDANE, *Ultramundanus*, beyond the world; is that of the universe supposed to be without, or beyond the limits of our world, or system.

UMBELLÆ,

UMBELLÆ, *Umbellis*, among botanifts, the round tufts or heads of certain plants fet thick together, and all of the fame heighth.

UMBELLIFEROUS PLANTS, are fuch as have their tops branched and fpread out like an umbrella; on each a little fubdivifion, on which there is growing a fmall flower; fuch are fennel, dill, &c.

This flower is always pentapetalous, and is fucceeded by two naked feeds adjoining to each other, which are the true characterifticks that diftinguifh thefe plants from others.

UMBER, or UMBRE, *Umbria*, among painters, &c. a kind of dry dufky-coloured earth, which, diluted with water, ferves to make a dark brown colour, ufually called with us a hair colour. It is called umber, from umbra, a fhadow, as ferving chiefly for the fhadowing of objects: or rather from Umbria, a country of Italy, whence it ufed to be brought.

UMBILICAL, *Umbilicalis*, in anatomy, fomething that relates to the umbilicus or navel.

UMBILICAL *Region*, is that part of the abdomen lying round about the umbilicus or navel. See ABDOMEN.

UMBILICAL *Veffels*, are an affemblage of veffels belonging to the fœtus, conftituting what we call the funiculus umbilicalis, or navel-ftring.

Thefe veffels are two arteries, a vein, and the urachus. The umbilical arteries arife from the iliacks, near their divifion into external and internal; and pafs thence, on each fide of the bladder, through the navel, to the placenta.

The umbilical vein, from innumerable capillaries united into one trunk, defcends from the placenta to the liver of the fœtus; where it is partly diftributed into the porta, and partly into the cava.

The urachus is only plainly found in brutes; though there is no doubt but it has a place, likewife, in mankind.

The ufe of thefe veffels is to maintain a continuity and communication between the mother and the fœtus. Some authors will have it, that the fœtus receives its food and increafe this way, and that it grows like a vegetable from the mother as the root, of which the umbilical veffels are the ftem; and the child the head or fruit of this plant animal.

UMBILICAL *Points*, in mathematicks, the fame with foci.

UMBILICUS, *Navel*, in anatomy, the centre of the middle part of the lower venter, or belly; being the place through which the umbilical veffels pafs, out of the fœtus, to the placenta of the mother.

UMBILICUS, in mathematicks, the fame with focus. See FOCUS.

UMBONE, or horn, among florifts, fignifies any pointed ftile, or piftil, in the middle of a flower.

There is, alfo, an umbone called doubly pointed, or by-parted, as in the piony; and fometimes the umbone has four fharp points, in which cafe it is termed an umbone divided into fo many heads, or cut into three or four parts.

UMPIRE, a third perfon, chofen to decide a controverfy left to an arbitration, in cafe the arbitrators cannot agree.

UNCIA, a term generally ufed for the twelfth part of a thing, in which fenfe it occurs, in Latin writers, both for a weight called by us an ounce, and a meafure called an inch.

UNCIÆ, in algebra, are the numbers prefixed to the letters of the members of any power produced from a binomial, or multinomial root.

Thus, in the fourth power of $a+b$, that is, $aaaa+4aaab+6aabb+4abbb+bbbb$, the unciæ are 4, 6, 4.

UNCTION, *Unctio*, the act of anointing or rubbing with oil, or other fatty matter.

UNCTION, in matters of religion, is ufed for the character conferred on facred things, by anointing them with oil.

UNDERSTANDING. The Cartefians define the underftanding to be that faculty whereby the mind converfing with, and, as it were, intent on itfelf, evidently knows what is true in any thing not exceeding its capacity.

The corpufcular philofophers define the underftanding to be a faculty expreffive of things which ftrike on the external fenfes, either by their images, or their effects, and fo enter the mind. Their great doctrine is; nihil eft in intellectu quod non prius fuerit in fenfu; and to this doctrine our famous Mr. Locke and moft of the lateft Englifh philofophers fubfcribe.

UNDERSTANDING, is alfo ufed for the act, exercife, or exertion of this faculty, or the action whereby the mind knows things, or reprefents them in idea to itfelf.

UNDER-*Treafurer of England*, vice thefaurarius Angliæ, an officer mentioned in the ftat. 39 Eliz. c. 7. and whom feveral other ftatutes confound with treafurer of the exchequer.

UNDERWOOD, *Sub bofcus*, coppice, or any wood that is not accounted timber.

UNDULATION, in phyficks, a kind of tremulous motion, or vibration, obfervable in a liquid, whereby it alternately rifes and falls, like the waves of the fea.

UNDULATION, is alfo ufed in chirurgery, for a motion enfuing in the matter contained in an abfcefs upon fqueezing it. A tumour is faid to be in a condition for opening when one perceives the undulation.

UNDULATORY *Motion*, is applied to a motion in the air, whereby its parts are agitated after the fame manner as waves in the fea; as is fuppofed to be the cafe when the ftring of a mufical inftrument is ftruck.

This undulatory motion of the air is fuppofed the matter or caufe of found.

UNGUENT, *Unguentum*, ointment, in chirurgery. Ointments are divided into fimple and compound, though it fo happens, that fome of the former are confiderably compounded; and, among the latter there are fome fimple ointments, and others very little compounded.

It frequently occurs that turpentine, cerufe, lard, and fome other things, are ordered to be wafhed in rofe-water, or the juice of fome herbs; but this is a circumftance that avails fo little to any purpofe of moment, that we never knew it complied with: fo that a continuation of fuch directions feems principally to be in compliment to the old prefcriptions, which abound in fuch minute exactnefs. It may here, alfo, be obferved in general, that where oil is directed in an ointment or plaifter, the wholefale traders, who feek only profit, generally fubftitute lard; and where cerufe, minium, or litharge are concerned, they are generally ufed in over proportions, becaufe they make fuch a weight come out much cheaper.

UNGUIS, a Latin term, fignifying a nail of the hand or foot.

UNGUIS, in anatomy, is applied to two bones of the nofe, being as thin as fcales, and refembling the nail; whence their name.

UNGUIS, or UNGUICULUS, among botanifts and florifts, denotes a little fpeck of a different colour from the reft of the petala, or leaves of flowers.

UNGULA, in geometry, is the fection of a cylinder cut off by a plane paffing obliquely through the plane of the bafe, and part of the cylindrick furface.

UNGULA, in natural hiftory, the claw or hoof of a quadruped.

UNGULA *Alcis*, the elk's claw. See ELK.

UNGULA, or HAMUS, among furgeons, a fort of hooked inftrument wherewithal to extract a dead fœtus out of the womb.

UNICORN, in natural hiftory, an animal famous among the Greek and Latin authors.

Thefe creatures were figured under the fhape of horfes, deer, hogs, and bulls, but all with the fingularity of an enormous horn in their foreheads. They, however, have no exiftence in nature, being only imaginary, as well as the virtues afcribed to this horn. That fubftance known in the fhops under the name of the unicorn's horn, is the tooth of a large cetaceous fifh, frequent in the feas bordering on Greenland and Iceland, where it is called narwhal: the authors who have written on fifhes in general, call it monocerus pifcis, the unicorn fifh.

UNIFORM, *Uniformis*, denotes a thing to be fimilar or confiftent either with another thing, or itfelf, in refpect of figure, ftructure, proportion, or the like. In which fenfe it ftands oppofed to difform.

UNIFORM *Flowers*, or *Plants*, are fuch as are of the fame figure all around, having their fore and back parts, as alfo their right and left parts, exactly alike.

UNIFORMITY, regularity, a fimilitude or refemblance between the parts of a whole. Such is that we meet

meet withal in figures of many sides and angles respectively equal and answerable to each other.

UNION, a junction, coalition, or assemblage of several different things in one.

UNION, in a philosophical sense, is used, by Dr. Grew, for one of the three ways of mixture; being the joining together of atoms or insensible particles, so as touch in a plane, as is supposed to be the case in the crystallizations of salt, and the like bodies.

UNION, among painters, expresses a symmetry and agreement between the several parts of a painting, when e. gr. there is a deal of relation and connection between them, both as to figures and their colouring: so that they apparently conspire to form one thing.

UNION, in architecture, may denote a harmony between the colours in the materials of a building.

UNION, *or the* UNION, by way of eminence, is more particularly used, among us, to express the act whereby the two seperate kingdoms of England and Scotland were incorporated into one, under the title of the kingdom of Great-Britain.

The happy union, in vain attempted by king James I. was at length effected in the year 1707, by the general consent of the queen and estates of each realm.

UNISON, in musick, is the effect of two sounds which are equal in degree of tune, or in point of gravity and acuteness.

Unison may be defined a consonance of two sounds produced by two strings, or other bodies of the same matter, length, thickness, and tension, equally struck, and at the same time, so that they yield the same tone or note.

Or it is the union of two sounds so like each other, that the ear, perceiving no difference, receives them as one and the same sound.

What constitutes unisonance, is the equality of the number of vibrations of the two sonorous bodies in equal times; where there is an inequality in that respect, and, of consequence, an inequality in degree of tune, the unequal sounds constitute an interval.

Unison is the first and greatest of concords; and the foundation, or, as some call it, the mother of all the rest: yet others deny it to be any concord at all, maintaining it to be only that in sounds, which unity is in numbers.

UNIT, UNITE, or UNITY, in arithmetick, the number one, or one single individual of discrete quantity.

UNITY, *Unitas*, the abstract, or quality which constitutes or determines a thing unum, or one.

UNITY, in poetry. In the drama there are three unities to be observed, the unity of action, that of time, and that of place. In the epick poem, the great, and almost only unity, is that of the action. Some regard, indeed, ought to be had to that of time; that of place there is no room for. The unity of character is not reckoned among the unities.

The unity of the dramatick action consists of the unity of the intrigue in comedy, and that of the danger in tragedy; and this not only in the plan of the fable, but also in the fable extended and filled with episodes.

The episodes are to be worked in without corrupting the unity, or forming a double action; and the several members are to be so connected together, as to be consistent with that continuity of action so necessary to the body, and which Horace prescribes, when he says, Sit quodvis simplex duntaxat et unum.

The unity of the epick action, M. Dacier observes, does not consist in the unity of the hero, or in the unity of his character and manners, though these be circumstances necessary thereto. The unity of action requires that there be but one principal action, of which all the rest are to be incidents or dependencies.

F. Bossu assigns three things requisite thereto; the first, that no episode be used but what is fetched from the plan and ground of the action, and which is a natural member of that body; the second, that the episodes and members be well connected with each other; the third is not to finish any episode, so as it may appear a whole action, but to let each be always seen in its quality of member of the body, and an unfinished part.

UNITY *of Possession*, in law, signifies a joint possession of two rights, by several titles.

UNIVERSAL, something that is common to many things, or it is one thing belonging to many, or all things.

UNIVERSAL, *Universale*, in logick, is either complex or incomplex. A complex universal, is either an universal proposition, as every whole is greater than its part; or whatever raises a manifold conception of the mind, as the definition of a reasonable animal.

An incomplex universal, is what produces only one conception in the mind, as a simple thing respecting many; as human nature, which relates to every individual wherein it is found.

UNIVERSAL *Arithmetick*. See *Universal* ARITHMETICK.

UNIVERSALITY, the quality that denominates a thing universal.

UNIVERSE, the whole extent of space.

As space is, in its own nature, infinite, we may form an idea of the infinity of the universe, which can, therefore, only in part, be comprehended by us: and that part of the universe which we can have any notion of, is that which is the subject of our senses; and of this the eye presents us with an idea of a vast extended prospect, and the appearance of various sorts of bodies disseminated through the same.

The infinite abyss of space, which the Greeks called the τὸ πᾶν, the Latin the inane, and we the universe, does undoubtedly comprehend an infinity of systems of moving bodies round one very large central one, which the Romans called sol, and we the sun. This collection of bodies is, therefore, properly called the solar system, and sometimes the mundane system, from the Latin word mundus, the world.

That the universe contains as many solar systems or worlds, as there are what we call fixed stars, seems reasonable to infer from hence, that our sun, removed to the distance of a star, would appear just as a star does, and all the bodies moving about it would disappear entirely. Now the reason why they disappear is, because they are opaque bodies, and too small to be seen at so great a distance, without an intense degree of light; whereas theirs is the weakest that can be, as being first borrowed, and then reflected to the eye.

But the sun, by reason of his immense bulk and innate light, which is the strongest possible, will be visible at an immense distance; but the greater the distance, the less bright it will appear, and of a lesser magnitude: and, therefore, every star of every magnitude may probably be a sun like our own, informing a system of planets or moving bodies, each of which may be inhabited, like our earth, with various kinds of animals, and stored with vegetable and other substances.

In this view of the universe, an august idea arises in the mind, and worthy of the infinite and wise Author of nature, who can never be supposed to have created so many glorious orbs to answer so trifling a purpose as the twinkling to mortals, by night now and then; besides that, the far greatest part of the stars are never seen by us at all, as we have observed under that article.

When, therefore, Moses tells us, that in the beginning God created the heavens and the earth, it is to be understood in a limited sense, and to mean only the making, or, rather, new-making, of our terraqueous globe; for it is expressly said, that the earth, in its first state, was a chaos (shapeless and void) which probably might be only the ruins of a pre-existent globe, inhabited by rational creatures in the same manner as since its renovation. And though it be said, God made two lights, the sun and the moon, it does not follow they had no existence before that time, any more than it does that the stars had not, which he is said to have made also.

Now, if the stars had no existence before the Mosaick creation, then were there no other systems of worlds before our own; then must all the infinity of space have been one eternal absolute inane or empty space till that time, and God, who made the worlds, must be supposed to have made them all at once: which suppositions are too extravagant and unreasonable, and, therefore, cannot be the sense of that passage of scripture; which, I think, can be no more than this, that, when God had formed the earth into an habitable globe, he gave it such a position and motion about the sun, and about its own axis, as should cause an agreeable variety in the length of days and nights, and in the temperature of the seasons of the year.

UNIVERSITY, *Universitas*, a collective term, applied

plied to an aſſemblage of ſeveral colleges eſtabliſhed in a city, or out-town, wherein are profeſſors in the ſeveral ſciences, appointed to teach them to ſtudents; and where degrees or certificates of ſtudy in the divers faculties are taken up.

In each univerſity four faculties are uſually taught, theology, medicine, law, and the arts and ſciences.

They are called univerſities, or univerſal ſchools, by reaſon the four faculties are ſuppoſed to make the world, or whole compaſs of ſtudy.

In the eye of the law, an univerſity is held a mere lay body, or community; though, in reality, it be a mixed body, compoſed partly of laymen, and partly of eccleſiaſticks.

Univerſities had their firſt riſe in the 12th and 13th centuries. Thoſe of Paris and Bologna pretend to be the firſt that were ſet on foot; but then they were on a different footing from the univerſities among us.

Our own univerſities, Oxford and Cambridge, ſeem intitled to the greateſt antiquity of any in the world; and Baliol and Merton colleges in Oxford, and St. Peter's in Cambridge, all made colleges in the 13th century, may be ſaid to be the firſt regular endowments, of this kind, in Europe.

For though Univerſity college in Cambridge had been a place for ſtudents ever ſince the year 872, yet this, like many of the other ancient colleges beyond ſea, and Leyden, to this day, was no proper college, but the ſtudents, without any diſtinction of habit, lived in citizens houſes, having only meeting-places to hear lectures and diſpute.

In after times there were houſes built for the ſtudents to live in ſociety; only each to be at his own charge, as in the inns of courts. Theſe, at firſt, were called inns, but now halls. At laſt, plentiful revenues were ſettled on ſeveral of theſe halls, to maintain the ſtudents diet, apparel, &c. and theſe were called colleges.

The univerſities of Oxford and Cambridge are governed, next under the king, by a chancellor, who is to take care of the government of the whole univerſity, to maintain the liberties thereof, &c.

Under him is the high-ſteward, whoſe office is to aſſiſt the chancellor, and other officers, when required, in the execution of their offices, and to hear and determine capital cauſes, according to the laws of the land, and the privileges of the univerſity.

The next officer is the vice-chancellor, who officiates for the chancellor in his abſence. There are alſo two proctors who aſſiſt in the government of the univerſity, particularly in the buſineſs of ſchool exerciſe, taking up degrees, puniſhing violators of the ſtatutes, &c. Add to theſe a publick orator, keeper of records, regiſter, beadles, and verger.

UNIVOCAL, in the ſchools, is applied to two or more names, or terms, that have but one ſignification, in oppoſition to equivocal, which is where one term has two or more ſignifications.

Our univocal terms are ſuch, whoſe name, as well as nature is the ſame, in oppoſition to equivocals, whoſe names are the ſame, but their natures very different.

UNLAWFUL, illegal, ſomething prohibited by, or contrary to the terms of law, either divine or human.

Unlawful *Aſſembly*, the meeting of three or more perſons together by force to commit ſome unlawful act, as to aſſault any perſon, to enter his houſe or land, &c. and thus abiding together, whether they attempt the execution or not.

UNLIMITED, or *Indeterminate Problem*, is ſuch a one as is capable of infinite ſolutions.

UNMOOR, a term uſed at ſea; when a veſſel who was riding at anchor weighs the ſame, or gets it up in order to ſail, they ſay ſhe is unmooring.

VOCABULARY, *Vocabularium*, in grammar, denotes the collection of the words of a language, with their ſignifications, otherwiſe called a dictionary, lexicon, or nomenclature.

The vocabulary is properly a leſſer kind of dictionary, which does not enter ſo minutely into the origins and different acceptations of words.

VOCAL, ſomething that relates to the voice or ſpeech.

Vocal *Muſick*, is muſick ſet to words, eſpecially verſes, and to be performed by the voice; in contradiſtinction to inſtrumental muſick, compoſed only for inſtruments, without ſinging.

VOCATIVE, in grammar, the fifth caſe or ſtate of nouns.

When we name the perſon we are ſpeaking to, or addreſs ourſelves to the thing we are ſpeaking of, as if it were a perſon, the noun, or name, requires a new relation, which the Latins and Greeks expreſs by a new termination, called the vocative.

Thus of *dominus*, *lord*, in the nominative, the Latins have made *domine*, *O lord*, in the vocative; of Antonius, Antoni, &c. but as this was a thing not abſolutely neceſſary, and as the nominative caſe might ſerve on ſuch occaſions, this new caſe, or termination, was not univerſal: in the plural, for inſtance, it was the ſame with the nominative, and even in the ſingular; it was only practiſed in the ſecond declenſion among the Latins; and in Greek, where it is the moſt common, it is frequently neglected, and the nominative uſed in its ſtead: as in that paſſage of the Greek pſalms quoted by St. Paul, to prove the divinity of Jeſus Chriſt; thy throne, O God!

In Engliſh, and moſt of the modern tongues, this caſe is ordinarily expreſſed in nouns that have an article in the nominative, by ſuppreſſing that article; as the Lord is my hope. Lord, thou art my hope! though, on many occaſions, we uſe an interjection.

VOICE, *Vox*, a ſound produced in the throat and mouth of an animal, by an apparatus of inſtruments for that purpoſe.

Voices are either articulate or inarticulate.

Articulate Voices, are thoſe whereof ſeveral conſpire together to form ſome aſſemblage, or little ſyſtem of ſounds. Such are the voices expreſſing the letters of an alphabet, numbers of which joined together form words.

Inarticulate Voices, are ſuch as are not organized, or aſſembled into words; ſuch is the barking of dogs, the lowing of beaſts, the ſinging of birds, &c.

Voice, in grammar, is a circumſtance in verbs, whereby they come to be conſidered as either active or paſſive, i. e. either an expreſſing an action impreſſed on another ſubject, as I beat; or receiving it from another, as I am beaten.

Voice, in matters of elections, denotes a vote or ſuffrage.

VOIDANCE, *Vacancy*, in the canon law, a want of an incumbent upon a benefice.

VOIDED, *Urde*, in heraldry, is underſtood of an ordinary whoſe inner or middle part is cut out, leaving nothing but its edges to ſhew its form; ſo that the field appears through it. Hence it is needleſs to expreſs the colour, or metal, of the voided part; becauſe it muſt of courſe be that of the field.

VOIDER, in heraldry, one of the ordinaries whoſe figure is much like that of the flaſque or flench, only that it doth not bend ſo much.

VOL, among heralds, ſignifies the two wings of a fowl joined together, borne in armoury, as being the whole that makes the flight. Accordingly, a demi vol is a ſingle wing.

VOLA, the palm, or inſide of the hand, comprehended between the fingers and the wriſt.

VOLANT, in heraldry, is when a bird in a coat of arms is flying, or having its wings ſpread out.

VOLATILE, in chymiſtry, are thoſe ſubſtances which riſe and fly off upon the application of heat or fire, as thoſe which endure the fire without diſſipation are called fixed.

Volatile, in phyſicks, is commonly uſed to denote a mixed body, whoſe integral parts are eaſily diſſipated by fire or heat; but is more properly uſed for bodies whoſe elements or firſt component parts are eaſily ſeparated from each other, and diſperſed in air.

VOLATILISATION, or Volatilization, the act of rendering fixed bodies volatile, or reſolving them by fire into a fine ſubtile vapour, or ſpirit, which eaſily diſſipates and flies away.

VOLCANO, or Vulcano, in natural hiſtory, a name given to mountains that belch or vomit fire, flame, aſhes, cinders, ſtones, &c.

Such are Mount Ætna in Sicily, Mount Veſuvius near Naples, &c.

Near Guatimala in South America, are two mountains, the one called a volcano of fire, the other of water. Out of the firſt, huge pieces of rocks are frequently hurled with as much vehemence as balls from a cannon, and a

written letter may be read by the light of its flames at the distance of three miles. Out of the other vast quantities of water are continually spued up. Volcanos and ignivomous mountains, though some of the most terrible phænomena in nature, have their uses; being a kind of spiracles, or tunnels whereby to vent the fire and vapour, and would otherwise make a more dreadful havock by convulsions and earthquakes.

Nay, if the hypothesis of a central fire and waters be admitted, those outlets must be absolutely necessary to the peace and quiet of the terraqueous globe. Accordingly, Dr. Woodward observes, there is scarce any country much annoyed with earthquakes, but has one of these fiery vents; which is constantly observed to be all in flames whenever an earthquake happens; by which means it disgorges the fire, which, while it was underneath, was the cause of the disaster. He adds, that were it not for these diverticula, whereby the central fire has an exit, it would rage in the bowels of the earth much more furiously, and make much greater havock than it does; and that there are not wanting instances of countries that have been wholly freed from earthquakes by the eruption of a new volcano there.

VOLLEY, a military salute made by discharging a great number of fire-arms at the same time.

VOLO, in antiquity, a name which the Romans gave the slaves who, in the second Punick war, offered themselves to serve in the army upon a want of a sufficient number of citizens.

VOLTE, in the menage, signifies a round or circular motion, consisting of a gait of two treads, made by a horse going side-ways round a centre; the two treads making parallel tracts, one, by the fore-feet, larger, and the other, by the hinder-feet, smaller; the shoulders bearing outwards, and the croup approaching towards the centre.

Demi-Volte, is half a round of one tread or two made by the horse at one of the angles or corners of the volte, or at the end of the line of the passade; so as when he is near the end of this line, or near one of the corners of the volte, he changes hands to return by a semi-circle.

Renversed, or inverted Volte, is a track of two treads, which the horse makes with his head to the centre and his croup out, side-ways upon a walk, trot, or gallop, and tracing out a larger circumference with his shoulders, and a smaller with his croup.

VOLUME, *Volumen*, a book, or writing, of a just bulk to be bound by itself.

Volume *of a Body*, is also used, among foreign philosophers, for its bulk or the space inclosed within its superficies.

VOLUMUS, in law, the first word of a clause in one species of the king's writs of protections and letters patent.

VOLUNT, *Voluntas*, in law, is when a tenant holds lands, &c. at the will of the lessor, or lord of the manor.

VOLUTE, *Voluta*, in architecture, a kind of spiral scroll, used in the Ionick and Composite capitals, whereof it makes the principal characteristick and ornament.

There are several diversities practised in the volute. In some, the bit or edge, throughout all the circumvolutions, is in the same line or plane; such are the antique Ionick volutes, and those of Vignola. In others the spires or circumvolutions fall back; in others project or stand out. Again, in some the circumvolutions are oval, in others, the canal of one circumvolution is detached from the list of another by a vacuity or aperture. In others the rind is parallel to the abacus, and springs out from behind the flower thereof. In others it seems to spring out of the vase from behind the flower thereof. In others it seems to spring out of the vase from behind the ovum, and rises to the abacus, as in most of the fine composite capitals.

VOLVULUS, in medicine, a name which some authors give to the iliack passion, by others called chordapsus, and by others miserere mei.

VOMER, in anatomy, a septum seated between the bones of the palate and the sphenoidal bone, being also joined to the process of the ethmoides, and part of the lower jaw, and having its fore part which is spongy continued to the middle cartilage or the nose, and making, in conjunction with it, the septum nasi.

VOMICA, in medicine, is commonly taken for a suppurated imposthume, or an abscess with a suppuration.

Vomica *Pulmonum*, is a latent disease of the lungs, which often deceives under a shew of health. What goes by this name is a small abscess seated in some part of the lungs, and straitly inclosed within a bag or membrane.

Nux Vomica, in pharmacy, a flat, compressed, round fruit of the breadth of a shilling, or somewhat more, and of about the thickness of a crown-piece. Its surface is not much wrinkled or corrugated, but sometimes marked with tolerably regular fibres, running from the centre to the circumference; it is somewhat downy or woolly, and of an extreme firm texture, tough like horn, and of a pale greyish brown colour. It has a sort of umbilicus on each side of the centre, and is more prominent on one side, and more depressed on the other; it is very difficultly cut or broken, and leaves a smooth and glossy surface behind the knife; it is moderately heavy, and is of a somewhat paler colour within than on the surface; it has no smell, but an extremely bitter taste.

We have it only from the East-Indies, whence it is brought with another drug called the lignum colubrinum. Though it has been but lately known, there have been many disputes between the people, who have seemed best acquainted with it at first, as to its nature and origin. It was held by many to be the root of a plant, and by others to be a fungus or excrescence. But it is in reality the nucleus of a fruit of an East-Indian tree, the wood of which is the lignum colubrium of the shops.

VOMITING, *Vomitus*, a retrograde spasmodick motion of the muscular fibres of the œsophagus, stomach, and intestines, attended with strong convulsions of the muscles of the abdomen and diaphragm, which, when gentle, create a nausea; when violent, a vomiting. These convulsive disorders proceed from the immoderate quantity, or acrimony of the food; from poisons; from some injury of the brain, as a wound, contusion, compression, or inflammation of that part; from an inflammation of the diaphragm, stomach, intestines, spleen, liver, kidnies, pancreas, or mesentery; from an irritation of the gula; from a disorderly motion of the spirits, by unaccustomed agitations in a coach, ship, or otherwise, or from the idea of something nauseous.

VOPISCUS, a Latin term used, in respect of twins in the womb, for that which comes to the perfect birth, the other being before excluded abortive.

VORTEX, *Whirlwind*, in meteorology, a sudden, rapid, violent motion of the air in gyres, or circles.

Vortex, *Vorago*, is also used for an eddy or whirlpool of a body of water, in certain seas or rivers, which runs rapidly around, forming a sort of cavity in the middle.

Vortex, in the Cartesian philosophy, is a system or collection of particles of matter moving the same way, and round the same axis.

Such vortices are the grand machines, whereby those philosophers solve most of the motions and other phænomena of the heavenly bodies. Accordingly the doctrine of these vortices makes a great part of the Cartesian philosophy. See Cartesians.

VOTIVE Medals, are those whereon the vows of the people for the emperors, or empresses, are expressed.

VOUCHEE, a person who is warranty, or vouches for another, who in respect thereof is called voucher.

VOUCHER, in law, the tenant in a writ of right who calls another person into court, bound to warranty him, and either to defend his right against the demandant, or to yield him other lands, &c. to the value.

Voucher also signifies a ledger book, or book of accounts, wherein are entered the warrants for the accountants discharge.

VOUSSOIR, vault-stone, or key-stone, in architecture, a stone proper to form the sweep of an arch, being cut somewhat in manner of a truncated cone, whose sides, were they prolonged, would terminate in a centre to which all the stones of the vault are directed.

VOW, *Votum*, a solemn promise, or offering of a man's self, or other thing, to God.

Vows, *Vota*, among the Romans, signify offerings, presents, and prayers made for the emperors, and Cæsars particularly, for their prosperity, and the lastingness of their empire.

VOWEL, *Vocalis*, in grammar, a letter which affords a com-

a complete found of itfelf; or a letter fo fimple as only to need a bare opening of the mouth to make it heard, and form a diftinct voice.

Such are a, e, i, o, u; which are called vocales, vowels, in contradiftinction to certain other letters, which, depending on a particular application of fome part of the mouth, as the teeth, lips, or palate, can make no perfect found without an opening of the mouth, that is, without the addition of a vowel; and are, therefore, called confonants.

UPRIGHT, in heraldry, is ufed in refpect of fhell fifhes, as crevices, &c. when ftanding erect in a coat.

URACHUS, in anatomy, a membranous canal in a fœtus, and that could not make its way through the navel to the placenta along with the umbilical veffels, whereof it is efteemed one.

The termination of the urachus in the placenta forms a little oval vefica or bladder, which ferves to receive the urine fecreted in the kidnies of the fœtus, and that could not make its way through the urethra, by reafon of the refiftance of the fphincter of the bladder which is not to be overcome but by infpiration. The humour found in the vefica of the urachus is ftill in the greater quantity the higher coloured, and the more like urine, as the fœtus is near the time of the birth.

The urachus is found only in brutes, though there is no difpute but it exifts in a human fœtus.

URANIBOURGH, a term often ufed by aftronomers, being the name of a celebrated obfervatory, in a caftle in the little ifland Vana, or Huena, in the Sound; built by that noble Dane, Tycho Brahe, and furnifhed with inftruments for obferving the courfe and motions of the heavenly bodies.

This famed obfervatory, which was finifhed about the year 1580, did not fubfift above feventeen years; when Tycho, who little thought to have erected an edifice of fo fhort a duration, and who had even publifhed the figure and pofition of the heavens, which he had chofe from that moment to lay the firft ftone in, was obliged to abandon his country. Soon after this, thofe to whom the property of the Ifland Huena was given, made it their bufinefs to demolifh Uranibourgh; part of the ruins were difperfed into divers places, the reft ferved to build Tycho a handfome feat upon his ancient eftate, which to this day bears the name of Uranibourgh; for as to the ancient Uranibourgh, there are now no footfteps remaining. It was here Tycho compofed his catalogue of the ftars.

M. Picart, making a voyage to Uranibourgh, found Tycho's meridian line drawn thereon to deviate from the meridian of the world; which confirms the conjecture of fome, that the pofition of the meridian line may vary.

URANOGRAPHY, a defcription of the heavens.

URETERS, in anatomy, two long and flender canals, which come from the bafon of the kidnies, one on each fide, and terminate in the bladder; ferving to convey the urine fecreted in the glands of the kidnies into the bladder. See KIDNIES.

URETHRA, in anatomy, is a tube or canal arifing from the neck of the bladder, and continued to the pupendum: ferving to difcharge or carry off the urine out of the bladder.

Some will have it to be only a production of the neck of the bladder itfelf: Its length is very different in the two fexes. In men it terminates in the extremity of the glands, and is ordinarily a foot long. In women, where it is called meatus urinarious, it is but two fingers breadth long, and terminates in the vulva; but it is much wider, and more eafily dilated here than in the other fex.

The urethra is compofed of two membranes, and a little fpongy fubftance like that of the corpora cavernofa; except at the end which joins the neck of the bladder, where the diftance between the membranes is fmall, and filled up with a red glandulous fubftance, whofe excretory ducts piercing the inner membranes, pour into the pipe a mucilaginous liquor, which lines and lubricates its cavity, and prevents the falts of the urine from galling it; as having a further office in the male fex, viz. the emiffion of the feed.

URIGO, a burning with a cauftick, or cautery.

URIM and THUMMIM. According to the Hebrew, *Exod.* xxviii. 30. the literal fignification of thefe two words is, *light* and *perfection*, or, *the fhining* and *the perfect*. According to St. Jerom, *doctrine* and *judgment*: according to the LXX, *declaration* or *manifeftation*, and *truth*. Some will have it, that the Urim and Thummim are only epithets or explanations of the ftones of the breaft-plate of the high-prieft; as if it were faid, "Thou "fhalt put therein ftones that are *fhining* and *perfect*." Others, to prove that the Urim and Thummim were not the fame thing with the twelve ftones in the breaft-plate, give the following reafons; 1. Becaufe the ftones were *fet* and *engraven* in the breaft-plate, *Exod.* xxviii. 17, 21. the Urim and Thummim only *put* into it, which is words of quite different and more loofe and large fignification, and therefore probably doth not defign the fame thing. 2. It is not likely, that in fuch a brief account of the facred utenfils, the fame command would be repeated again; efpecially in more dark and general words than it was mentioned before. And how could Mofes put it in, when the workmen had faftened it there before? Or, why fhould he be required to put it in the breaft-plate, when it was faftened to it already, and could not, without violence, be taken from it? 3. Becaufe the ftones were put in by the workmen, *Exod.* xxxix. 10. the Urim and Thummim by Mofes himfelf, *Lev.* viii. 8. It is objected, that where the ftones are mentioned, there is no mention of Urim and Thummim, as in *Exod.* xxxix. 10. And that where the Urim and Thummim are mentioned, there is no mention made of the ftones, as in *Lev.* viii. 8. which fhews they were one and the fame thing. To which they anfwer, that there is an evident reafon for both thefe omiffions; of the former in *Exodus*, becaufe Mofes mentions only thofe things which were made by the workmen, whereas the Urim and Thummim feems to have been made immediately by God, or by Mofes with God's direction: of the latter in *Leviticus*, becaufe the ftones are implied in the breaft-plate as a part of it, and faftened to it, whereas there Mofes only mentions what was put in by himfelf. Some fay that the Urim and Thummim were two little golden figures which gave refponfes, which were fhut up in the breaft plate as in a purfe, and which anfwered, with an articulate voice, to all fuch queftions as were put to them by the high-prieft. Others think, that the name *Jehovah*, written upon a plate of gold, was what the fcripture calls Urim and Thummim. There are various conjectures concerning the Urim and Thummim, but nothing certain, becaufe the fcripture is filent in this matter. It may fuffice us to know, that this was a fingular piece of divine workmanfhip, which the high-prieft was obliged to wear upon folemn occafions, as one of the conditions upon which God engaged to give him anfwers.

There is a great diverfity of opinions likewife concerning the manner in which God was confulted by Urim and Thummim. It is agreed, that this way of confultation was ufed only in affairs of very great importance; that the high-prieft was the only officiating minifter in this ceremony; and that for this he was to be clothed in all his pontifical habit; particularly, he was to have on his breaft-plate, to which the Urim and Thummim was affixed; and laftly, that he was not allowed to perform this folemn confultation for a private perfon, but only for the king, for the prefident of the Sanhedrim, for the general of the army of Ifrael, or for other public perfons: and even then not upon any affair of a private nature, but for things that relate to the public welfare of church or ftate.

When the Urim and Thummim was to be confulted, the high-prieft put on his robes, and prefented himfelf, not in the fanctuary, where he could not enter but once a year, but in the holy place, before the curtain that parted the moft holy from the holy place. There, ftanding upright, and turning his face toward the ark of the covenant, upon which the divine prefence repofed, he propofed the matter for which he had been confulted. Behind him at fome diftance out of the holy place, ftood the perfon for whom he was confulted, expecting, with humility and reverence, the anfwer that it fhould pleafe the Lord to give him. The Rabbins, who are followed by Jofephus, Philo, and feveral of the ancient Fathers, are of opinion, that the high-prieft having then his eyes fixed upon the ftones of the breaft-plate, which was before him, he there read the anfwer of the Lord. The letters that raifed themfelves out of their places, and that fhined with more than ordinary luftre, were formed into the

the anſwer deſired. For example, when David enquired of God, whether he ſhould go up to one of the cities of Judah, 2 Sam. ii. 1. it was anſwered him, ALAH, *Go up*. The three letters, Am, Lamed, and He, came out of their places, as it were, and raiſed themſelves above the reſt, to compoſe that word that contained the anſwer.

But there are ſome difficulties in this opinion. All the letters of the Hebrew alphabet were not found in the breaſt-plate; there were four wanting, Heth, Teth, Zade, and Koph. To ſupply theſe, the Rabbins pretend, that the names of Abraham, Iſaac, and Jacob, were alſo upon the breaſt-plate; but for all that, Teth would be ſtill wanting. Therefore they ſay, that this title alſo was read there, *Golelle-ſchibte-Iſrael—See here all the tribes of Iſrael*. But all this is advanced without proof, and without the leaſt probability. A ſecond difficulty is this, that though one ſhould admit all that the Hebrew doctors ſuggeſt in this affair, yet by what rules did the high-prieſt make a combination of theſe letters, and how put he them together? For it is not ſaid that they came out of their places, but that they only raiſed themſelves above the reſt. Suppoſe, for example, that any ſix of the letters ſhould have ſwelled and ſhined with more than ordinary luſtre; how muſt the high-prieſt diſpoſe them, which muſt be firſt or laſt? It is anſwered, that in this circumſtance he was always inſpired and filled with the ſpirit of propheſy; and if it were ſo, then the Urim and Thummim would have been unneceſſary. For why muſt miracles be multiplied without any occaſion? The high-prieſt need only ſpeak himſelf, and perhaps the whole uſe of the Urim and Thummim was this, to be a ſign to the high-prieſt that the Lord would repleniſh him with an internal and ſupernatural light, and make him know his will in what enquired after.

Others think with a great deal of probability, that God then gave his anſwers in articulate voices, which were heard within the ſanctuary, and from between the cherubims, which covered the ark or the propitiatory. When the Iſraelites made peace with the Gibeonites, they were blamed for not having *enquired at the mouth of the Lord*, Joſh. ix. 14. which inſinuates, that he had been uſed to make his voice heard when he was conſulted.

If it be enquired, how long the cuſtom of conſulting God by Urim and Thummim ſubſiſted in Iſrael. The Rabbins think, that it continued no longer than under the tabernacle. It is a maxim among them, that the holy Spirit ſpake to the children of Iſrael by Urim and Thummim while the tabernacle remained; and under the firſt temple, i. e. the temple of Solomon, by the prophets; and under the ſecond temple, or after the captivity of Babylon, by the *Bath-kol*, or *the daughter of the voice*. By this they mean a voice ſent from heaven, as that which was heard at the baptiſm of Chriſt, and at his transfiguration, Matt. iii. 17. and xvii. 5.

Spencer has adopted this opinion, and endeavours to ſupport it by theſe two arguments. The firſt is, that the Urim and Thummim were a conſequence of the divine government, or of the theocracy of the Hebrews. While the Lord immediately governed his people, it was neceſſary that there ſhould always be a means at hand to conſult him, and to have recourſe to him. Secondly, that this method was eſtabliſhed to conſult God upon affairs that concerned the common intereſt of the whole nation. But the theocracy ceaſed, ſays he, when the kingdom became hereditary in the perſon and family of Solomon: the intereſts of the nation ceaſed to be common, after the diviſion of Iſrael into two monarchies; one governed by Rehoboam, and the other by Jeroboam. Laſtly, what ſeems to be more convincing than any reaſon drawn from a conformity of things, it does not appear from the ſacred hiſtory, that there are any footſteps of conſulting the Lord by Urim and Thummim, after the conſtruction of the temple of Solomon to the time of its deſtruction; and after its deſtruction, all are agreed, that this was never reſtored to them again.

URINAL, in medicine, a veſſel fit to receive and hold urine; and uſed, accordingly, for the conveniency of ſick perſons.

It is uſually of glaſs, and crooked; and ſometimes filled with milk, to aſſuage the pain of the gravel.

URINARIA FISTULA, is the ſame as urethra; ſo called from its office to convey the urine.

URINE, *Urina*; a liquid excrement, or humour, ſeparated from the blood in the kidnies, conveyed thence into the bladder, and diſcharged by the urethra.

The urine is ſecreted from the arterial blood, in the glands of the kidnies; from which ariſe numerous little pellucid pipes and veins, which, receiving the ſecreted urine, at length join into twelve papillæ; out of which the urine oozes into a cavity, called the pelvis, from whence it runs into the ureters of either ſide, and through them into the bladder; and from that, at length, through the urethra, out of the body.

Phyſicians diſcover from the urine the principal criterions, or ſigns, whereby they judge of the condition of the patient, and the ſtate of the diſeaſe.

But it is chiefly conſulted in acute fevers, where it is a very ſure ſign. For, 1°, Urine with a white, light, equable, turbinated, inodorous ſediment, through the whole courſe of the diſeaſe to the criſis, is a very good preſage. 2°. Copious, white, ſtrangurious urine, with much white ſediment, emitted at the time of the criſis, cures and takes away abſceſſes. 3°. A thin, ruddy urine, that does not ſubſide; a white, thin, watery urine; a thin, equable, yellow urine; a turbid urine, that does not ſubſide, denotes, in very acute diſeaſes, a great crudity, a difficult criſis, and a durable dangerous diſeaſe.

URINOUS *Salts*, in chymiſtry, are the ſame with what we otherwiſe call alcali ſalts, or alcalies.

URN, *Urna*, a kind of vaſe of a roundiſh form, but biggeſt in the middle, like the common pitchers, now ſeldom uſed, but in the way of ornament over chimney-pieces, or by way of acroters a-top of buildings, funeral monuments, &c.

URN, *Urna*, was alſo a Roman meaſure for liquid things, containing about three gallons and a half of Engliſh wine meaſure.

UROCRITERIUM, or UROCRISIA, a caſting of water, or giving judgment on diſeaſes by the ſight of the urine.

URSA, in aſtronomy, the bear, a name common to two conſtellations of the northern hemiſphere near the poles, diſtinguiſhed by major and minor.

URSA *Major*, or the great bear, according to Ptolemy's catalogue, conſiſts of thirty-three ſtars; according to Tycho's, of fifty-ſix; but in the Britannick catalogue we have two hundred and fifteen.

URSA *Minor*, the little bear. Ptolemy and Tycho make it conſiſt of eight ſtars; but Mr. Flamſtead of fourteen.

URSULINES, an order of nuns who obſerve the rule of St. Auguſtine, and are chiefly noted for taking on them the education and inſtruction of young ladies.

USANCE, *Uſo*, in commerce, is a determinate time for the payment of bills of exchange, reckoned either from the day of the bills being accepted, or from the day of their date: and thus called, becauſe regulated by the uſage and cuſtom of the places whereon they are drawn.

Bills of exchange are drawn at ſingle or double uſance, either from ſight or from date.

This term is longer or ſhorter, according to the different countries. In France, uſance is fixed at thirty days; at London, uſance is a calendar month, and double uſance two months, or ſixty days.

At Venice, Genoa, and Leghorn, three months.

At Hamburgh, uſance of bills drawn from England, France, and Venice, is two months after date; from Antwerp and Nuremberg, fifteen days after ſight.

At Venice, uſance of bills drawn at Ferrara, Bologna, Florence, Lucca, and Leghorn, is five days after ſight; from Naples, Auſburg, Genoa, and Vienna, fifteen days after ſight; from Mantua, Modena, and Milan, twenty days after date; from Amſterdam, Antwerp, and Hamburgh, two months after date; and, from London, three months after date.

At Milan, uſance of bills drawn from Genoa, is eight days after ſight; from Rome, ten days after ſight; and from Venice, twenty days after date.

At Florence, uſance of bills, drawn from Bologna, is three days after ſight, from Rome, ten days after ſight; from Venice and Naples, twenty days after date.

At Rome, uſance of bills drawn in Italy was originally ten days after ſight; but, by an abuſe, this term has been extended to fifteen.

At Leghorn, ufance of bills drawn from Genoa is eight days after fight; from Rome, ten days; from Naples, three weeks; from Venice, twenty days after date; from London, three weeks; and, from Amfterdam, forty days.

At Amfterdam, ufance of bills drawn from England and France, is a month after date; from Venice, Madrid, Cadiz, and Seville, two months.

At Genoa, ufance of bills from Milan, Florence, Leghorn, and Lucca, is eight days after fight; from Venice, Rome, and Bologna, fifteen days; from Naples, twenty-two days; from Sicily, a month after fight; or two months after date; from Sardinia, a month after fight; from Antwerp, Amfterdam, and other places in the Low Countries, three months after date.

USE, *Ufus*, in law, denotes the benefit or profit of lands and tenements.

Use *and Cuftom*, in ancient law-books, denotes the ordinary method of acting or proceeding in any cafe, which, by length of time, has obtained the force of law.

Uses *and Cuftoms of the Sea*, are certain maxims, rules, or ufages, which make the bafe or ground-work of the maritime jurifprudence; by which the policy of navigation, and commerce of the fea, are regulated.

USHER, *Huiffier*, fignifies an officer, or fervant, who has the care and direction of the door of a court, hall, chamber, and the like.

Usher, is alfo ufed for an officer in the Exchequer; of which fort, three or four attend the chief officers and barons at the court at Weftminfter, and juries, fheriffs, and other accomptants, at the pleafure of the court.

USNEA, in natural hiftory, mufcus arboreus, a fort of plant of the parafite or mofs kind, growing like a great beard on the oak, cedar, and divers other trees.

Usnea *Humana*, is a fmall greenifh mofs growing on human fculls, that have lain a long time expofed to the air.

USQUEBAUGH, a ftrong, rich, compound liquor, chiefly taken by way of dram; its bafis being brandy, or rectified fpirits of wine.

The procefs is fomewhat various, and the ingredients numerous. We fhall give one, formerly much commended, as a fpecimen.

To two gallons of brandy, or fpirits, put a pound of Spanifh liquorice, half a pound of raifins of the fun, four ounces of currants, three of dates fliced; tops of thyme, balm, favory, mint, and tops of flowers of rofemary, of each two ounces; cinnamon and mace bruifed, nutmegs, anifeeds, and coriander feeds bruifed, likewife, of each four ounces; citron, or lemon and orange-peel fcraped, of each an ounce.

All thefe to be left to infufe forty-eight hours in a warm place, often fhaking them together: then fet them in a cool place for a week, after which the clear liquor is to be decanted off, and to it an equal quantity of neat white port-wine, and a gallon of canary, are to be added. The whole to be fweetened with a proper quantity of double-refined fugar.

USTION, *Uftio*, in pharmacy, the preparing of certain fubftances by burning them.

USUCAPTION, *Ufucaptio*, in the civil law, is an acquifition of the property of a thing, by a poffeffion and enjoyment thereof for a certain term of years prefcribed by law.

USUFRUIT, *Ufu-fructus*, in the civil law, the ufe or enjoyment of any lands or tenements; or the right of receiving the fruits and profits of an inheritance, or other thing, without a power of alienating or changing the property thereof.

USURER, a perfon charged with a habit or act of ufury.

USURIOUS Contract, is any bargain or contract whereby a man is obliged to pay more intereft for money than the ftatute allows.

USURPATION, in law, is an injurious ufing or enjoyment of a thing for continuance of time, that belongs of right to another.

USURY, *Ufura*, in the general, denotes a gain or profit which a perfon makes of his money, by lending the fame; or it is an increafe of the principal, exacted for the loan thereof, or the price a borrower gives for the ufe of a fum credited to him by the lender, called alfo intereft; and, in fome ancient ftatutes, dry exchange.

The word ufury is ufually taken in a bad fenfe, viz. for an unlawful profit which a perfon makes of his money; in which fenfe it is that ufury is forbidden by the civil and ecclefiaftical law, and even by the law of nature. In this fenfe it alfo is, that it is held ufury to lend money upon pawns, to exact intereft for money without furrendering the principal, and to ftipulate intereft for money which is not employed in trade, nor brings any profit to the perfon who receives it: but as the Latin word ufura, at leaft the plural thereof, ufuræ, may be underftood of a lawful intereft, we do not fee why ufury may not be ufed in Englifh, in the fame harmlefs fenfe.

UT, in mufick, the firft of the mufical notes. This note, with the reft, were taken out of the hymn of St. John Baptift.

UTENSIL, *Utenfile*, a little domeftick moveable, belonging principally to the kitchen. Such are pots, pans, &c.

Utensils, are more particularly ufed in war, for the moveables which the hoft is obliged to furnifh the foldiers quartered with him; which are, a bed with bedcloaths, a pot and a fpoon.

UTERINE, *Uterinus*, fomething belonging to the uterus, or womb of a woman.

Furor Uterinus, in medicine, denotes a kind of madnefs, attended by lafcivious fpeeches and geftures, and an invincible inclination to venery.

UTERUS, the womb, in anatomy, a hollow body, called alfo the matrix, of a form approaching to that of a pear, fituated between the bladder and the rectum, and deftined to the office of generation, for the containing the fœtus. It is connected in the anterior part with the vagina, and at its lateral parts by the ligaments, lata and rotunda, being loofe in its hinder part.

In women not with child, the length of the uterus is about three inches; its breadth, in the upper part, being about two inches, and in the lower part one. Its thicknefs is about an inch and an half; in virgins, indeed, it is much fmaller than this; but in women with child it is of a different fize, according to the different time of geftation.

Anatomifts divide it into two parts; the upper and broader part they call the fundus uteri, and the lower they call the cervix, into which it is that the vagina opens. See Vagina.

The orifice, or, as it is otherwife called, the internal mouth of the womb, opens into the vagina, in form of the glans penis in men: it is very fmall in virgins, but in women who have had children, or who are with child, it is larger; and in the laft it is always clofed up with a glutinous humour: in the time of delivery, it in a wonderful manner expands itfelf, fo as to give paffage to the child.

UVEA, in anatomy, aciniformis tunica, the third tunick or membrane of the eye, thus called, as refembling the colour or figure of a grape. See Eye.

The hind part of this coat, or that next the orbit of the eye on each fide, is called the choroides, and is derived from the pia mater.

The anterior, or fore part, is like the former, tranfparent, but thinner, and is, by authors, reckoned as a different tunick, and called uvea.

Of the duplicature of this part is formed that ftriped variegated circle, called the iris.

And, in its middle, is a perforation, through which appears a little black fpeck, which is the fight or pupil of the eye, and about which the iris forms a ring.

From the infide of this membrane fpring certain fibres, which fpread themfelves round the cryftalline humour, ferving to contract or dilate the fight at pleafure, and called the ligamentum ciliare.

UVULARIA, in botany, a genus of plants, whofe flower confifts of fix oblong, erect, lanceolated petals, with an oblong nectarium cut into the bafe of each petal; the ftamina are fix very fhort filaments, topped with long erect antheræ; the fruit is an ovato-oblong trilocular capfule, containing many roundifh compreffed feeds.

VULGATE, a very ancient Latin tranflation of the bible, and the only one the church of Rome acknowledges authentick.

The ancient Vulgate of the Old Teftament was tranflated almoft word for word from the Greek of the Seventy.

ty. The author of the verſion is not known, nor ſo much as gueſſed at.

VULNERARY, in medicine, an epithet given to remedies proper for the cure of wounds and ulcers.

VULVA, a name which ſome phyſicians give to the uterus, or womb.

VULVA is alſo, though leſs, properly uſed for the cunnus, or pudendum muliebre.

VULVA, in anatomy, a round, ſoft, ſpongious body, like the end of a child's finger, ſuſpended from the palate, near the foramina of the noſtrils, perpendicularly over the glottis.

Its uſe is to break the force of the cold air, and prevent its entering too precipitately into the lungs.

It is formed of a duplicature of a membrane of the palate, and is called, by ſome authors, columella, and by others gurguglio.

It is moved by two pair of muſcles, and ſuſpended by as many ligaments. The muſcles are the external, called the ſphenoſtaphylinus, which draws the vulva upwards and backwards, and hinders the maſticated aliment from paſſing into the foramina of the noſtrils in deglutition.

And the internal, called the pterygoſtaphylinus, which draws the vulva upwards and forwards.

Both muſcles move the vulva upwards, to give room for ſwallowing; and ſerve to raiſe it when relaxed and fallen down. In which caſe it is uſeful to promote its riſing, by applying a little beaten pepper in the end of a ſpoon to it.

Bartholin ſays, that ſuch as have no vulva are ſubject to the phthyſick, and uſually die thereof, by reaſon the cold, in entering the lungs too haſtily, corrupts them.

UXORIUM, in antiquity, a fine or forfeit paid by the Romans for not marrying.

UZIFIR, UZUFAR, or UZIFUR, in chymiſtry, a name which ſome authors give to cinnabar.

W.

W A letter peculiar to the northern languages and people. It is compounded of two ſingle V's, as is implied in the name. This letter, though never uſed by the Hebrews, Greeks, or Romans, was yet among the Arabians and all the northern nations, the Teutons, Germans, Saxons, and Britons, &c. But ſtill it is not uſed by the Spaniards, French, Portugueſe, or Italians. The letter is of an ambiguous nature, being a conſonant at the beginning of words, and a vowel at the end; for it ſtands before all vowels but u, as water, welfare, winter, woeful; and is ſounded at the end like u, as ſow, few, ſaw; it precedes r in wrath; and follows s in ſwear; as alſo th, in thwart. It is obſcure in ſhadow, widow, &c.

WADD, or WADDING, in gunnery, a ſtopple of paper, hay, ſtraw, but at ſea, ſpun yarn, or rope yarn, made from old junk forced into a gun upon the powder, to keep it cloſe in the chamber; and, where a cannon is loaded with ball, there is one put in to keep it from rolling out.

WAFT. To waft a ſhip, to convey her ſafe, as men of war do merchant-ſhips.

WAGER, or WAGING, in law, ſignifies the giving ſecurity for the performance of any thing.

WAGGONER, in aſtronomy, part of the conſtellation Urſa major, called alſo Charles Wain. See the article CHARLES *Wain*.

WAGGONER, is alſo uſed for a routier, or book of charts, deſcribing the ſeas, their coaſts, &c.

WAINSCOT, in building, the timber work ſerving to line the walls of a room; being uſually in pannels, and painted to ſerve inſtead of hangings.

According to Neve, wainſcoting with Norway oak, the workman finding ſtuff, is valued at ſix or ſeven ſhillings per yard ſquare. Plain ſquare wainſcoting, the workman finding deal, is valued at three ſhillings per yard. Large biſſection wainſcoting, with Dantzick ſtuff, is valued at ſix or ſeven ſhillings per yard; and ordinary biſſection work about half as much. In taking dimenſions, they uſe a ſtring which they preſs into all the mouldings; it being a rule that they are to be paid for all where the plane goes.

WAKE *of a Ship*, is the ſmooth water a-ſtern when ſhe is under ſail.

WAKES, *Vigils*, or *Country Wakes*, are certain ancient, anniverſary feaſts in ſeveral pariſhes, wherein the people were to be awake at the ſeveral vigils, or hours, to go to prayers.

They are uſually obſerved in the country on Sunday next after the ſaint's day to whom the pariſh church is dedicated.

WALKERS, a ſort of foreſt officers appointed by the king to walk a certain ſpace of ground committed to their care and inſpection.

WALL, in architecture, a work of brick, ſtone, wood, or the like, which make the principal part of a building, as ſerving both to incloſe it, or ſeparate particular rooms, and to ſupport the roof, floors, &c.

Method of meaſuring WALLS. Bricklayers moſt commonly meaſure their walls by the rod ſquare, each rod being by the ſtatute $16\frac{1}{2}$ feet; ſo that a ſquare contains $272\frac{1}{4}$ ſuperficial feet.

Therefore, when they have taken the dimenſions (viz. the length and height) of the wall in feet, they multiply the length by the height, by croſs multiplication, and divide the product by $272\frac{1}{4}$, and the quotient ſhews the number of ſquare rods in the ſuperficies of that wall.

But, it being troubleſome to divide by $272\frac{1}{4}$, workmen have a cuſtom to divide 272 only, which gives the contents ſomething more than the truth.

When they have then found the area, or contents of the whole ſuperficies of a wall, they in the next place conſider its thickneſs; for they have a certain thickneſs to which they reduce all their walls, and this ſtandard is one brick and a half thick, as they phraſe it, (i. e. the length of one brick, and the breadth of another;) ſo that a wall of three bricks thick, of the ſame height and length with another of one and a half brick thick, the former will contain twice as many ſquare rods as the latter.

Now, to reduce any wall to this ſtandard thickneſs, take the following rule, which is plain and eaſy:

Multiply the area by the number of half bricks in the thickneſs of the wall, and divide that product by three; the quotient will give the true area, at the ſtandard thickneſs.

But, if the wall be of different thickneſſes, as they uſually are in brick houſes, being made thickeſt below and thinner at every ſtory, then the beſt way will be to meaſure every different thickneſs by itſelf, and to reduce it to the ſtandard thickneſs, and afterwards add all theſe ſeveral areas into one ſum; out of which deduct the doors and windows, meaſured by themſelves, and the remainder will be the true area or content of the whole walling.

Note, that in ſome places it is the cuſtom to meaſure by the rod of eighteen feet long, and in others by the rod of ſixteen feet. In the former caſe, the area in the feet muſt be divided by three hundred and twenty-four, and in the latter by three hundred and fifty-ſix.

WAPENTAKE, or WEAPENTAKE, a diviſion of certain northern countries, particularly thoſe beyond the Trent, anſwering to what in other places is called a hundred or a cantred.

WAR, *Bellum*, a conteſt or difference between princes, ſtates, or large bodies of people; which, not being determinable

terminable by the ordinary meaſures of juſtice and equity, is referred to the deciſion of the ſword.

Hobbe's great principle is, that the natural ſtate of man is a ſtate of warfare; moſt other politicians hold war to be a preternatural and extraordinary ſtate.

Civil, or *Inteſtine* WAR, is that between ſubjects of the ſame realm, or between parties in the ſame ſtate. In this ſenſe, we ſay the civil wars of the Romans deſtroyed the republick; the civil wars of Granada ruined the power of the Moors in Spain; the civil wars in England, begun in 1641, ended in the king's death, 1648.

Religious WAR, is a war maintained in a ſtate on account of religion, one of the parties refuſing to tolerate the other.

Holy WAR, is that anciently maintained by leagues and croiſades, for the recovery of the Holy Land.

Council of WAR, is an aſſembly of great officers, called by a general or commander, to deliberate with him on enterpriſes and attempts to be made. On ſome occaſions, council of war is alſo underſtood of an aſſembly of officers, ſitting in judgment on delinquent ſoldiers, deſerters, coward officers, &c.

WARD, is a word uſed in law books, in divers ſignifications. Thus a ward, in London, is a part of the city committed to the ſpecial charge of one of the aldermen of the city. There are twenty-ſix wards in London, which are as hundreds, and the pariſhes thereof as towns. A foreſt is alſo divided into wards, and ſo are moſt of our hoſpitals.

WARD, *Warda*, or *Wardagium*, is alſo uſed, in our ancient writings, for the cuſtody of a town or caſtle, which the tenants and inhabitants were bound to keep at their own charge.

WARDA ECCLESIARUM, the guardianſhip of churches; which is in the king, during vacancies, by reaſon of the regalia or temporalities.

WARDEN, *Guardian*, one who has the charge or keeping of any perſon, or thing, by office.

WARDEN, in an univerſity, the head of a college; anſwering to what in other colleges we call the maſter thereof.

WARDEN, or *Lord* WARDEN, *of the Cinque Ports*, the governor of theſe noted havens, who has the authority of an admiral, and ſends out writs in his own name.

WARDEN *of the Mint*, an officer whoſe buſineſs it is to receive the gold and ſilver bullion brought in by the merchants to pay them for it, and overſee the other officers. He is alſo called keeper of the exchange and mint.

WARD-*Hook*, in gunnery, a rod or ſtaff with an iron end turned ſerpentways, or like a ſcrew, to draw the wads or oakam out of a gun, when it is to be unloaded.

WARDMOTE, in London, is a court ſo called which is kept in every ward of the city, anſwering to the curiata comitia, in ancient Rome.

WARDROBE, a cloſet, or little room adjoining to a bed-chamber, ſerving to diſpoſe and keep a perſon's apparel in; or, for a ſervant to lodge in, to be at hand to wait, &c.

WARDROBE, in a prince's court, is an apartment wherein his robes, wearing apparel, and other neceſſaries are preſerved under the care and direction of proper officers.

WARN, in law, to ſummon a perſon to appear in a court of juſtice.

WARNING WHEEL, in a clock, is the third or fourth according to its diſtance from the firſt wheel.

WARP, in the manufactures, is the threads, whether of ſilk, wool, linen, hemp, &c. that are extended lengthways on the weaver's loom; and acroſs which the workman, by means of his ſhuttle, paſſes the threads of the woof, to form a cloth, ribband, fuſtian, or other matter.

For a woollen ſtuff to have the neceſſary qualities, it is required that the threads of the warp be of the ſame kind of wool, and of the ſame fineneſs throughout; that they be ſized with Flanders or parchment ſize, well prepared, and that they be in ſufficient number with regard to the breadth of the ſtuff to be wrought.

To WARP *a Ship*, is to ſhift her from one place to another, when the wind and tide will permit it without danger.

WARRANT, an act, inſtrument, or obligation, whereby a perſon authoriſes another to do ſomething which he otherwiſe had not a right to do.

WARRANT *of Attorney*, is that whereby a man appoints another to do ſomething in his name, and warrants his action. It ſeems to differ from a letter of attorney, which paſſes under hand and ſeal of him who makes it, before creditable witneſſes; whereas, warrant of attorney, in perſonal, mixed, and ſome real actions, is put in of courſe by the attornies for the plaintiffs or defendants.

WARRANTY, *Warrantia*, a promiſe or covenant by deed, made by the bargainer for himſelf and his heirs, to warrant and ſecure the bargainee and his heirs againſt all men, for enjoying the thing agreed on between them.

WARRANTIA *Chartæ*, a writ that lies for a perſon who is enfeoffed in lands and tenements, with clauſe of warranty, and is impleaded in an aſſize, or writ of entry, wherein he cannot vouch or call to warranty.

WARRANTIA, *Diei*, a writ which lies in caſe where a man, having a day aſſigned perſonally to appear in court to an action wherein he is ſued, is, in the mean time, by commandment employed in the king's ſervice; ſo that he cannot come at the day aſſigned. It is directed to the juſtices, ordering them not to find or record him in default.

WARREN, *Warrena*, a franchiſe, or place privileged either by preſcription or grant from the king, to keep beaſts and fowl or warren in; as rabbits, hares, partridges, pheaſants, &c.

By a ſtatute 21 Edward III. a warren may lie open, and there is no need of cloſing it in, as there is a park.

WART, *Verucca*, a little round hard excreſcence ariſing on the fleſh like a pea.

A wart begins at the cutis, and ſeems to be either an effloreſcence of the ſerum of the blood, which hardening in the ſurface of the ſkin, makes a dry tumour, or elſe ſome ſmall luxuriancy of the little arteries of the cutis, which thruſt out themſelves, making a petty ſarcoma, which we call a ſoft wart.

According to the variety of the tumour, it is ſometimes whole with a ſmooth ſurface, ſometimes chapped and uneven.

The method of cure which deſerves to be firſt mentioned, is by ligature or vincture; this is performed upon ſuch of theſe excreſcences as are ſlender about the roots, and in a manner pendant, by firmly tying about them an horſe hair, or a ſilken or linen thread. The warts, being deprived of the juices which nouriſh them through a conſtriction of the veſſels by the ligature, gradually wither and fall away.

Another method of cure, is by the ſurgeon's inſtrument, in which the wart is taken up by an hook, or forceps, and then very nicely ſeparated by the ſciſſars. The wound is treated for ſome time with an application of the lapis infernalis, or ſome other corroding medicine, that, if any part of a root ſhould remain, from which a new tubercle might ariſe, it may be conſumed and deſtroyed.

WASHING, in painting, is when a deſign, drawn with a pen or crayon, has ſome one colour laid over it with a pencil, as Indian ink, biſtre, or the like, to make it appear the more natural, by adding the ſhadow of prominences, apertures, &c.

Theſe waſhes are uſually given in equal teints or degrees throughout; which are afterwards brought down and ſoftened over the lights with fair water, and ſtrengthened with deeper colours for the ſhadows.

WASHING *of Colours*. Some colours are of ſuch a gritty, ſandy nature, that it is impoſſible to grind them ſo fine as ſome curious works require; therefore, in order to get forth the flour and fineneſs of the colour, you muſt do thus:

Take what quantity of colour you pleaſe to waſh, and put it into a veſſel of fair water; ſtir it about till the water be all coloured therewith, and, if any filth ſwim on the top of the water, ſcum it clean off, and when you think the groſſeſt of the colour is ſettled at the bottom, then pour off that water into another earthen veſſel that is large enough to contain the firſt veſſel full of water four or five times; then pour more water into the firſt veſſel, and ſtir the colour that remains till the water be thick; and after it is a little ſettled, pour the water alſo into the ſecond veſſel, and fill the firſt veſſel again with water, ſtirring it as before; do this ſo often, as till you find all the fineſt of the colour drawn forth, and that

none but coarse gitty stuff remains in the bottom; then let this water in the second vessel stand to settle till it is perfectly clear, and that all the colour be sunk to the bottom; which when you perceive, then pour the water clear from it, and reserve the colour in the bottom for use, which must be perfectly dried before you mix it with oil to work.

The colours thus ordered, are red lead, blue and green bice, verditer, blue and green smalt, and many times Spanish brown, when you would cleanse it well from stones for some fine work, as also yellow oker, when you intend to make gold size of it.

WASHING, or WASHES, among goldsmiths, coiners, &c. are the lotions whereby they recover the particles of gold and silver out of the sweep; i. e. ashes, earths, sweepings, &c. of their shops.

These matters being ground and mixed together, are put in large wooden basons, where they are washed in several waters which run off by inclination into troughs underneath; carrying with them the earth, and the insensible particles of the metals, and only leaving behind them the larger and more considerable ones which are visible to the eye, and taken out by the hand without more trouble.

To get out the finer parts gone off with the earth, they use quicksilver and a washing-mill.

This mill consists of a large wooden trough, at bottom of which are two metalline parts, serving as mill-stones; the lower being convex, and the upper, which is in form of a cross, concave.

At the top is a winch placed horizontally, which turns the upper piece round; and at bottom, a bung to let out the water and earth, when sufficiently ground.

The trough is filled with common water, into which they cast thirty or forty pounds of quicksilver, and two or three gallons of the matter remaining from the first lotion. Then turning the winch, they give motion to the upper mill-stone, which grinding the matter and the quicksilver violently together, the particles of gold and silver become the more easily amalgamated therewith. This work they continue for two hours, when, opening the bung, the water and earth runs out, and a fresh quantity is put in.

The earths are easily passed thus through the mill three times, and the same quantity of mercury usually serves all the three times. When there is nothing left in the mill but the mercury united with the gold or silver which it has amalgamated, they take it out, and washing it in divers waters, they put it in a ticking bag, and lay it in a press to squeeze out the water, and the loose quick-silver; the remaining quicksilver they evaporate by fire, in a retort, or an alembick. The metal which remains they refine with lead, or part it with aqua fortis.

WAST, or WASTE, *Vastum*, in law, has divers significations. It is used for a spoil, made either in houses, woods, lands, &c. by the tenant for life or for years, to the prejudice of the heir, or of him in reversion or remainder.

Upon this the writ of waste is brought for recovery of the thing wasted, and treble damages.

WASTE *of the Forest*, is properly where a man cuts down his own woods within the forest, without licence of the king, or lord chief justice in eyre.

WASTE is also taken for those lands which are not in any man's occupation, but lie common.

They seem to be so called because the lord cannot make such profit of them, as of his other lands, by reason of the use others have thereof, for passing to and fro. Upon this none may build, cut down trees, dig, &c. without the lord's licence.

WASTE *of a Ship*, is that part of her between the main and fore masts.

WASTE-BOARDS, are boards sometimes set upon the side of a boat, or other vessel, to keep the sea from breaking into her.

WATCH is used for a corps de guards posted at any passage, or a company of guards who go on the patrole.

WATCH, at sea, signifies a measure or space of four hours, because half the ship's company watch and do duty in their turns, so long at a time; and they are termed star-board watch, and larboard watch.

WATCH is also used for a small portable movement or machine for the measuring of time, having its motion regulated by a spiral string.

Watches, strictly taken, are all such movements as shew the parts of time; as clocks are such as publish it, by striking on a bell, &c. But, commonly, the name watch is appropriated to such as are carried in the pocket, and clock to the large movements, whether they strike or not.

WATCH-WORK, is that part of the movement of a clock or watch which is designed to measure and exhibit the time on a dial-plate, in contradistinction to that part which contributes to the striking of the hour, &c. which is called clock-work.

The several members of the watch part are, 1. The balance, consisting of the rim, which is its circular part, and the verge, which is its spindle; to which belong the two pallets or levers that play in the teeth of the crown-wheel.

2. The potence, or pottance, which is the strong stud in pocket watches, whereon the lower pevet of the verge plays, and in the middle of which one pevet of the balance-wheel plays; the bottom of the potence is called the foot, the middle part the nose, and the upper part the shoulder.

3. The clock, which is the piece covering the balance.

4. The regulator or pendulum spring, which is the small spring in the new pocket-watches underneath the balance.

5. The pendulum, whose parts are the verge, pallets, cocks, and the bob.

6. The wheels, which are the crown-wheel in pocket-pieces, and swing-wheel in pendulums, serving to drive the balance or pendulum.

7. The contrate-wheel, which is that next the crown-wheel, &c. and whose teeth and hoop lie contrary to those of other wheels; whence the name.

8. The great, or first wheel, which is that the fusee, &c. immediately drives: after which are the second wheel, third wheel, &c.

Lastly, between the frame and dial-plate, is the pinion of report, which is that fixed on the arbour of the great wheel, and serves to drive the dial-wheel, as that serves to carry the hand.

For the theory and calculation of watch-work, see the article CLOCK.

WATER, in general, implies a pellucid fluid, convertible into ice by cold; naturally pervading the strata of the earth, and flowing on its surface.

Pure water would require a definition very different from this, that of a limpid and colourless liquor, without smell or taste, simple and volatile. But such a definition would not include the waters impregnated with metalline, stony, saline, and other fossile particles.

The figure of the component parts of water appears to be smooth and spherical, like those of quicksilver; whence it becomes extremely moving and penetrating. Thus it readily enters the pores of wood, leathers, skins, chords, musical strings, &c. thus likewise it becomes capable of moving and agitating particles of matter less active than itself, and so proves the more immediate physical agent of fermentation, putrefaction, solution, &c. and thus it also conveys earthy and saline matters through filtres of paper, stone, &c. and even raises some proportion of them in distillations. Its particles likewise appear to be extremely minute, and so have a large share of surface.

Hence water is admirably fitted for a solvent, or for readily entering the pores of salts, and coming into full contact with all their particles; and thus it will pass where air cannot, on account of its moisture, or lubricating power, whereby it fastens mucilaginous matters, and will therefore soak through the close pores of a bladder.

The specifick gravity of water, and consequently its goodness by its lightness, are to be directly judged of by the hydrostatical balance. This experiment is a good substitute for several other ways of examining the purity and goodness of waters, both common and mineral; for it appears by numerous instances, that light waters are, cæteris paribus, the best, purest, and wholesomest. That water is accounted best and wholesomest, which is not only the lightest and freest from earthy sediment, but that which is most spirituous; and these properties are usually found in pure rain-water; that being naturally

distilled

diftilled from the ocean and rivers, or by the heat of the fun raifed up into the atmofphere, from whence it is returned much after the manner of common diftillation.

Dr. Shaw, from a great variety of experiments, made upon water, deduces the following axioms:

Firft, That water is naturally contained in fome of the drieft and hardeft bodies, and in the drieft air. 2. That itfelf naturally contains an earthy fubftance. 3. That it is the proper menftruum of falts, diffolving more of one, and lefs of another. 4. That one good fign of its purity and wholefomenefs is levity. 5. That the ingredients of a mineral water may be difcovered by chymical expedients: and, 6. That mineral waters are imitable by art from fuch difcovery.

Secondly, That water is of infinite ufe in all the works both of nature and art, as without it there could be no generation, nutrition, or accretion, performed in any of the animal, vegetable, mineral, marine, or atmofpherical regions. The blood could not flow in the veins, the fap in the veffels of vegetables, nor the particles of minerals concrete and grow together, without water. It is this that makes the largeft part of our blood, our drink, and other aliments. There could be no corruption, fermentation, or diffolution, carried on without it; no brewing, no diftilling, no wines, no vinegar, no fpirits, made without it.

Thirdly, That we meet with water under an infinite variety of forms, and in an infinite variety of bodies, as that of air, vapour, clouds, fnow, hail, ice, fap, wines, blood, flefh, bone, horn, ftone, &c. through all which it feems to pafs unaltered, as an agent or inftrument that fuffers no alteration by re-action, but remains capable of refuming the form of water again upon any occafion.

Fourthly, That water, in its own common ftate, appears to be a combination of all the elements together, as containing a quantity of fire, which keeps it fluid; a quantity of air, and a quantity of earth: whence it can be no wonder that water alone, as it appears to the fenfes, fhould fuffice for vegetation in fome cafes, where little earth is wanted, or for fupporting animal and mineral life, where no great degree of nutriment is required; and hence it proves a gluten, or cement, to fome bodies, and a folvent to others; thus it confolidates brick, plafter of Paris, ftone, bone, &c. but diffolves falts, and fubtile earths approaching to falts, and becomes the inftrumental caufe of their action.

Fifthly, That water conveys nourifhment, or a more fixed and folid matter to the parts of vegetables, where having depofited it, the finer fluid perfpires into the atmofphere, which gives us the phyfical caufe of the dampnefs and unwholefomenefs of woody countries, as they remarkably find in America. For all large vegetables act after the manner of forcing-pumps, continually draw in large quantities of water at their roots, and difcharge it at their leaves, which intimates a method of collecting water in dry countries, and likewife of making falt-water frefh.

Sixthly, That the water, in paffing through plants, after having depofited its more terreftrial part, does not always go off pure, but impregnated with the finer effluvia, or more fubtile particle of the vegetable; thus, making an atmofphere round every plant, according to its nature, odoriferous or otherwife, which fupplies us with a rule for procuring the odoriferous waters of vegetables by diftillation.

Seventhly, That the particles, not fine enough to go off thus along with the water, are left behind upon the furface of the leaves and flowers of plants, being now thickened or ftrained from their moifter parts, and remaining in the form of honey, manna, gums, balfams, &c. according to the nature of the vegetable. And hence appears the phyfical caufe of plants proving more odoriferous and fweet when the weather is both warm and moift, as immediately after a fummer's fhower.

Eighthly, That the chymical operator fhould form to himfelf an hygrometer, for the fervice of his elaboratory, to determine the proportion of water at all times contained in the air, which continually mixes with his preparations, differently augments their weight, and promotes or hinders many of his operations.

Ninthly, That pure water makes the largeft part of mineral-waters, where it is impregnated as a menftruum, with feveral ingredients that it diffolves or drinks up in its paffage through the earth.

Water is of the utmoft ufe in divers of the mechanical arts and occafions of life, as in the motion of mills, engines, fountains, and other machines; the conftruction of all which, fubfervient thereto, or founded thereon, as fiphons, pumps, &c. make the fubject of hydraulicks.

The laws, properties, &c. of this fluid, with refpect to its motion, gravitation, preffion, elevation, action, momenta, and velocities, &c. which make the fubject of hydroftaticks, may be feen under the articles FLUID, HYDROSTATICKS, HYDRAULICKS, &c.

WATER, in hydography and geography, is a common or general name applied to all liquid tranfparent bodies, gliding or flowing on the earth; in which fenfe, water and earth are faid to conftitute our terraqueous globe.

For the periodical changes, to which the water of the fea is liable, fee EBB, FLUX, and TIDES.

WATERS, in medicine, pharmacy, &c. called alfo artificial and medicated waters, are a kind of liquors procured or prepared by art from divers bodies, principally of the vegetable tribe, having various properties, and ferving for various properties.

Thefe waters are either fimple, or compound: fimple waters are thofe procured from fome one vegetable body, the intention of which is to draw out the virtues of the herb, feed, flower, root, or the like, fo as it may be more conveniently given in that form than any other. The means whereby this feparation is effected, are either evaporation, infufion, decoction, or diftillation.

Compound waters, or thofe wherein feveral ingredients are ufed, are very numerous, and make a large article in commerce, fome prepared by the apothecaries, according to the difpenfatory prefcripts, for medicinal ufes; others by the diftillers, to be drank by way of dram; and others by the perfumers, &c. They are diftinguifhed by different epithets, in refpect either of the fpecifick virtues of the water, or the parts of the body for the cure whereof they are intended, or the difeafes they are good againft, or the ingredients they are compounded of, or their different ufes, &c.

And as thefe waters are exceeding numerous, and the manner of making them is not always the fame, we muft refer the chymical or medical reader to the difpenfatories, wherein he will find, that every one gives his own method as the beft.

We have only three general remarks to add, with regard to thofe intended for drinking, viz.

1. That fuch wherein any thing is infufed, as bruifed fruits, pounded herbs, &c. or ground fpices, muft be always paffed through a filtre, to make them finer and purer.

2. That thofe made with brandy, or fpirit of wine, are ufually diftilled after mixing their ingredients, which renders thofe liquors exceeding ftrong and dangerous.

3. That the waters which take their names from particular things, as cinnamon, &c. have often fome other ingredients joined with them, according to the tafte or fmell required.

Holy-WATER, a water prepared every Sunday in the Romifh church, with divers prayers, exorcifms, &c. ufed by the people to crofs themfelves withal, at their entrance to and going out of church; and pretended to have the virtue of wafhing away venial fins, driving away devils, preferving from thunder, diffolving charms, fecuring from, or curing difeafes, &c.

Many of the reformed take the ufe of holy-water to have been borrowed from the luftral-water of the ancient Romans. See LUSTRATION, &c.

WATER-ORDEAL, or *Trial*, among our anceftors, was of two kinds, by hot and by cold water.

Trial, or purgation, by boiling or hot water, was a way of proving crimes, by immerging the body, or arm, in hot water, with divers religious ceremonies. In the judgment by boiling water, the accufed, or he who perfonated the accufed, was obliged to put his naked arm into a caldron full of boiling water, and to draw out a ftone thence placed at a greater or lefs depth, according to the quality of the crime. This done, the arm was wrapped up, and the judge fet his feal on the cloth, and at the end of three days they returned to view it, when if

if it was found without any ſcald, the accuſed was declared innocent.

The nobles, or great perſonages, purged themſelves thus, by hot-water, and the populace by cold water.

The trial, or purgation by cold water, was thus: after certain prayers and other ceremonies, the accuſed was ſwaddled, or tied up, all in a pelotoon or lump, and thus caſt into a river, lake, or veſſel, of cold water, where, if he ſunk, he was held criminal; if he floated, innocent.

In the Levitical law, we find mention made of water which ſerved to prove, whether or no a woman was an adultreſs; the formula, as it was performed by the prieſt, may be ſeen in the fifth chapter of the book of Numbers.

Water, among jewellers, is properly the colour or luſtre of diamonds and pearls. The term, though leſs properly, is ſometimes uſed for the hue or colour of other ſtones.

Water-Measure. Salt, ſea-coal,&c. while aboard veſſels in the pool or river, are meaſured with the corn-buſhel heaped up; or elſe five ſtricked pecks are allowed to the buſhel. This is called water-meaſure.

Water-Mill, a machine for grinding corn, &c. driven by the water.

In water-mills, the momentum of the falling water is the power; the force to be overcome is the great attrition of the two ſtones in grinding the corn, &c. which is effected wholly by a complication of wheels and axles. A query may here be put, Why, ſince the power conſtantly acts upon the wheel, the motion of the wheel ſhould be equable, and not accelerated? The anſwer is, The increments of velocity keep riſing, till their momentum is equalled by the reſiſtance of the machine; after which æquilibrium, the wheel goes on with an uniform motion.

Water-Shoot, a young ſprig which ſprings out of the root or ſtock of a tree.

Water-Table, in architecture, a ſort of ledge left in ſtone, or brick walls, about eighteen or twenty inches from the ground, from which place the thickneſs of the wall begins to abate.

Water-Way, in a ſhip, is a ſmall ledge of timber, lying fore and aft on the deck, cloſe by her ſides, to keep the water from running down there.

Water-Works, in general, denote all manner of machines moved by, or employed in raiſing or ſuſtaining water; in which ſenſe, water-mills of all kinds, ſluices, aqueducts, &c. may be called water-works.

The term water-works, however, is more particularly uſed for ſuch machines as are employed only in raiſing water.

Explanation of Plate LXXVIII, *repreſenting the Water-works at Nymphemburg.*

The hydraulick machine at Nymphemburgh was erected by order of the elector of Bavaria, in order to ſupply the gardens of that palace with water. It was projected by the Count de Whal, maſter of the works to that prince, and is a well-contrived machine for anſwering the purpoſes intended. It raiſes the water ſixty feet high into a reſervoir erected in the gardens for its reception.

We have given two views of this uſeful machine in *Plate* LXXVIII. and, in order to render its conſtruction more eaſy to be underſtood, the ſame letters are placed in both figures to the ſame parts of the machine.

Fig. 1. Is a front perſpective view of the whole machine, when the building in which the pumps, &c. are incloſed is taken away. And (*fig.* 2.) an oblique perſpective view of one half of the machine, the other being incloſed in the building.

The machine conſiſts of twelve forcing pumps, conſtructed in the common form; and are worked in the following manner:

A, A, (*fig.* 1.) are cranks at the ends of the axis of the water-wheel. From theſe cranks ſtrong iron rods, B, B, are extended to the balances C, C, (ſee both figures.) Theſe cranks, by their revolutions, give an alternative motion to the balances, and conſequently cauſe the piſton rods, F, F, faſtened to each ſide of the balances, to move up and down in an alternate manner. G, G, G, are the upper parts of the tubes of the pumps, three of which on each ſide of the machine, are fixed in the troughs H, I, K. From each of theſe pumps is a tube L, L, L, through which the water is forced up by the motion of the piſtons. Theſe three tubes unite into one large pipe t O, a little above the wood-work of the machine; and ſoon after, the pipes O, O, unite into a ſtill larger one, as P, P. The latter are continued to the reſervoir erected to receive the water. The troughs in which the pumps are fixed, are ſupplied with water by the conduct pipe R.

The whole machine is put in motion by means of the water in the canal Q, which, falling down an inclined plane, turns the great water-wheel, and conſequently works the forcing pumps.

WATERING, in the manufactures, is to give a luſtre to ſtuffs, &c. by wetting them lightly with gum-water, and then paſſing them through the preſs, or calender, whether hot or cold.

The gum-water ought to be pure, thin, and clear, otherwiſe the folds of the ſtuff will ſtick together: the operation muſt alſo be performed when the water is very hot, that it may penetrate.

WAVE, *Unda*, in philoſophy, a cavity in the ſurface of water, or other fluid, with an elevation aſide thereof. See Fluid.

The waves of the ſea are of two kinds, natural and accidental. The natural waves are thoſe which are exactly proportioned in ſize to the ſtrength of the wind, whoſe blowing gives origin to them. The accidental waves are thoſe occaſioned by the wind's re-acting upon itſelf by re-percuſſion, from hills and mountains, or high ſhores, and by the waſhing of the waves themſelves, otherwiſe of the natural kind, againſt rocks and ſhoals: all theſe caſes give the waves an elevation, which they can never have in their natural ſtate.

Mr. Boyle has proved, by numerous experiments, that the moſt violent wind never penetrates deeper than ſix feet into the water; and it ſhould ſeem a natural conſequence of this, that the water moved by it can only be elevated to the ſame height of ſix feet from the level of the ſurface in a calm: and this ſix feet of elevation being added to the ſix of excavation, in the part whence that water ſo elevated was raiſed, ſhould give twelve feet for the utmoſt elevation of a wave.

This is a calculation that does great honour to its author; for Count Marſigli meaſured carefully the elevation of the waves near Provence, and found that, in a very violent tempeſt, they aroſe only to ſeven feet above the natural level of the ſea, and this additional foot in height he eaſily reſolved into the accidental ſhocks of the water againſt the bottom, which was, in the place he meaſured them in, not ſo deep as to be out of the way of affecting the waves; and he allows, that the addition of one-ſixth of the height of a wave, from ſuch a diſturbance from the bottom, is a very moderate alteration from what would have been its height in a deep ſea; and concludes, that Mr. Boyle's calculation holds perfectly right in deep ſeas, where the waves are purely natural, and have no accidental cauſes to render them larger than their juſt proportion.

In deep water, under the high ſhores of the ſame part of France, this author found the natural elevation of the waves to be only five feet; but he found alſo, that their breaking againſt rocks, and other accidents, to which they were liable in this place, often raiſed them to eight feet high.

We are not to ſuppoſe, from this calculation, that no wave of the ſea can riſe more than ſix feet above its natural level in open and deep water; for waves immenſely higher than theſe are formed, in violent tempeſts, in the great ſeas. Theſe, however, are not to be accounted waves in their natural ſtate, but they are ſingle waves formed of many others; for in theſe wide plains of water, when one wave is raiſed by the wind, and would elevate itſelf up to the exact height of ſix feet, and no more, the motion of the water is ſo great, and the ſucceſſion of the waves ſo quick, that, during the time this is riſing, it receives into it ſeveral other waves, each of which would have been at the ſame height with itſelf; theſe run into the firſt wave, one after another, as it is riſing: by this means its riſe is continued much longer than it naturally would have been, and it becomes terribly great. A number of theſe complex waves ariſing together, and being continued in a long ſucceſſion, by the continuation of the ſtorm, makes the

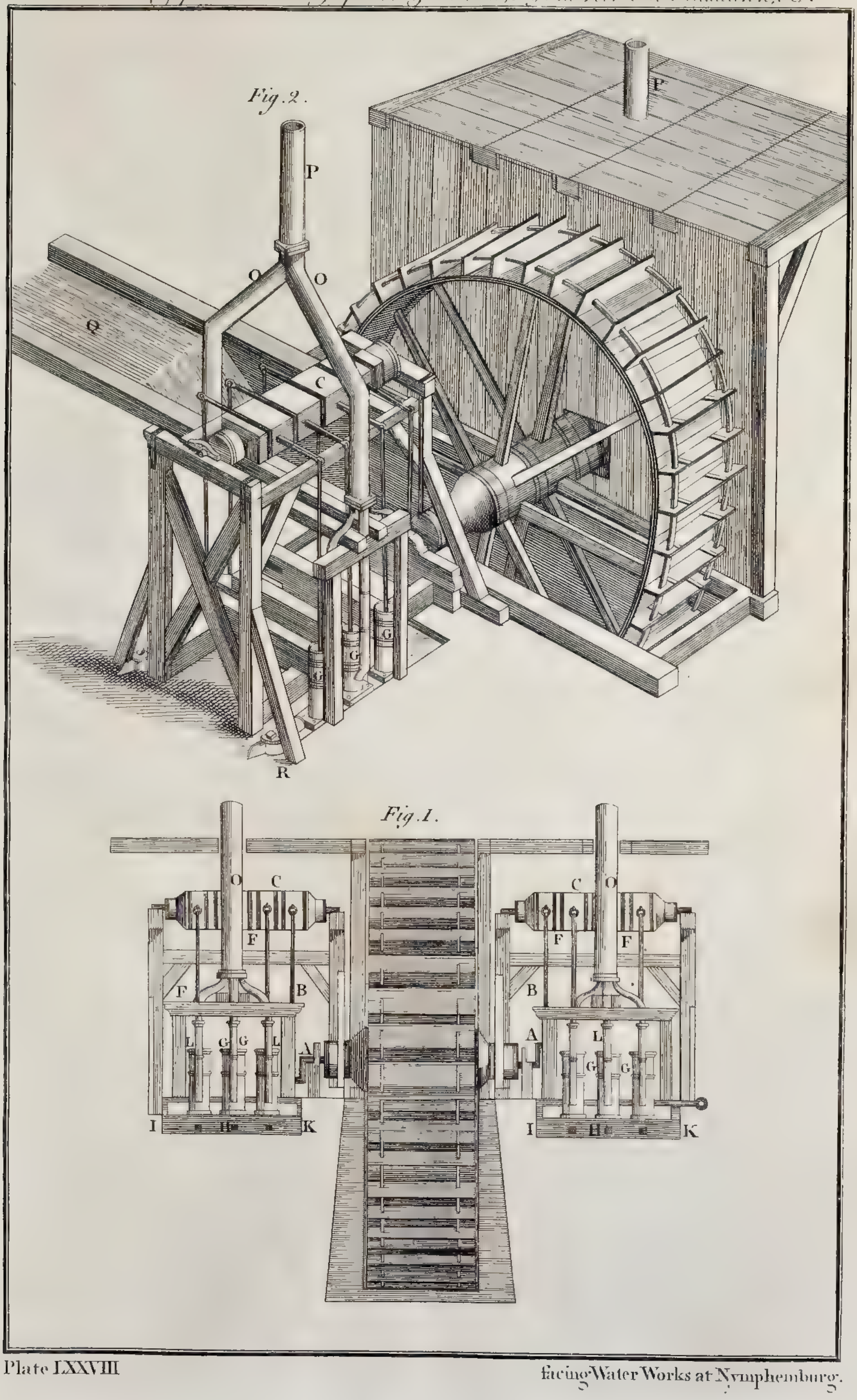

Plate LXXVIII

facing Water Works at Nymphemburg.

the waves ſo dangerous to ſhips, which the ſailors, in their phraſe, call mountains high.

WAVE-OFFERING, in Jewiſh antiquity, a ſacrifice offered by agitation, or waving, towards the four cardinal points of the compaſs. See SACRIFICE.

WAVED, WAVY, or WAVEY, in heraldry, is ſaid of a bordure, or any ordinary, or charge, in a coat of arms, having its out-lines indented, in manner of the riſing and falling of waves: it is uſed to denote, that the firſt of the family in whoſe arms it ſtands, acquired its honours for ſea-ſervice.

WAVING, in the ſea-language, is the making ſigns to a veſſel to come near, or keep off.

WAX, or *Bees*-WAX, in natural hiſtory, a firm and ſolid ſubſtance, moderately heavy, and of a fine yellow colour, formed by the bees from the farina of flowers, which they work up and compreſs into a maſs, or ſort of cake, and of which they form their honey-combs. See APIS.

The beſt ſort is that of a lively yellow colour, and an agreeable ſmell, ſomewhat like that of honey: when new, it is toughiſh, yet eaſy to break; but by age it becomes harder and more brittle, loſes its fine colour, and in a great meaſure its ſmell.

From the common yellow wax, by the mere effect of ſun and air, or by what is called bleeching, is formed what we term white wax, and ſome, very improperly, virgin wax. As the greater the ſurface is in proportion to the quantity, the ſooner and more perfectly this operation is performed. The uſual way is to melt the wax in hot water; when melted, they preſs it through a ſtrainer of tolerable fine linen, and pour it into round and very ſhallow moulds. When hardened by cooling, it is taken out and expoſed to the ſun and air, ſprinkling it now and then with water, and often turning it; by this means, it ſoon becomes white. The beſt ſort is of a clear and almoſt tranſparent whiteneſs, dry, hard, brittle, and of an agreeable ſmell, like that of the yellow wax, but much weaker.

The common yellow wax is of very great uſe, both in medicine and many of the arts and manufactures. It is ſometimes given internally, as in dyſenteries, and other eroſions of the inteſtines; but its great uſe is in the making of ointments and plaiſters for external uſe, and the greater part of thoſe of the ſhops owe their conſiſtence to it. The white wax is alſo an ingredient in ſome of the cerates and ointments of the ſhops; and is uſed in making candles, and in many of the nicer arts and manufactures, where wax is required.

Preparations of WAX. The butter and oil of wax are thus prepared: cut the wax in pieces, and put them into a retort, which muſt be half filled with theſe pieces; and the reſt of the retort being filled with ſand, it muſt be placed in a ſand furnace. At firſt, an acid ſpirit ariſes; and afterwards a thick oil, called the butter of wax, ſticks in the neck of the retort, unleſs it be heated by applying a live coal. This may be rectified into a thin oil, by diſtilling it ſeveral times, without addition, in a ſand heat.

The butter is an extremely ſoft and anodyne unguent, highly emollient and relaxing, agreeable to the nerves, and, when rubbed on contracted limbs, proves of great benefit to them. It is an excellent liniment for the piles, and takes off the pain attending them in a very ſudden and ſurprizing manner. It alſo keeps the ſkin ſoft, and is one of the beſt things known to keep it from cracking or chopping in the winter.

The oil of wax has alſo a very ſingular virtue in curing contracted tendons, and reſtoring flexibility to the parts. It cures chapped nipples in women who give ſuck, beyond any other application; and it is as ſucceſsful againſt chapped lips, and the cracking of the ſkin of the hands, only rubbing them once in three or four days with it. It is alſo of great uſe in diſcuſſing cold tumours ariſing on the face, and thoſe on the fingers in winter.

Grafting-WAX, a compoſition ſerving to bind the graft to the cleft of the ſtock. For the manner of making which, ſee the article GRAFTING.

Sealing-WAX, a compoſition uſed in ſealing letters, &c. Fine ſealing-wax is made in the following manner: Take half a pound of ſhell-lack, an ounce of vermillion, and a drachm of gum benjamin; melt and mix them well over the fire, and when of a proper coolneſs, make it up into rolls or cakes.

Green ſealing WAX is made after the ſame manner, and in the ſame proportions, by mixing with the ingredients verdigreaſe inſtead of vermillion.

Blue ſealing WAX is alſo made after the ſame manner, by putting in fine blue ſmalt, or ultramarine.

Purple ſealing WAX is made by putting in vermillion mixed with ivory-black, or lamp-black.

Black ſealing WAX is made with ivory-black, inſtead of vermillion.

WAY, a paſſage or road.

Milky-WAY. See GALAXY.

WAY *of a Ship*, is ſometimes the ſame as her rake, or run, forward or backward: but this term is moſt commonly underſtood of her ſailing. Thus when ſhe goes apace, it is ſaid that ſhe hath a good way, or makes a freſh way. So when an account is kept how far ſhe ſails, by the log, it is called keeping an account of her way; and becauſe moſt ſhips are apt to fall a little to leeward of their true courſe, they always, in caſting up the log-board, allow ſomething for her leeward-way.

WAY *of the Rounds*, in fortification, is a ſpace left for the paſſage of the rounds between the rampart and the wall of a fortified town. This is not now much in uſe; becauſe the parapet, not being above a foot thick, is ſoon overthrown by the enemy's cannon.

WAY-WISER, an inſtrument otherwiſe called perambulator. See PERAMBULATOR.

WAY-WODE, a title given to the governors of the chief places in the empire of Muſcovy, as alſo in Poland.

WEANING. A new-born infant requires aliment ſuitable to their tender ſtomachs, therefore nature has not only provided it for them at their mother's breaſt; but has alſo given us plain directions when to change it for a ſtronger and more ſubſtantial diet.

Exerciſe and motion, are the well-known promoters of digeſtion, therefore as a child is incapable of ſufficient exerciſe and motion to digeſt ſolid food, a thin fluid is provided for its ſuſtenance, which is almoſt converted into nouriſhment before it is taken into the ſtomach of the infant. And, leſt the mother ſhould be ſo imprudent as to offer it improper aliment, Providence ſeems to have ſecured the tender ſtomach, in ſome degree, from the miſchiefs of indigeſtion, by a ſingular artifice, namely, that of denying the child the uſe of teeth for the firſt months. Hence is it not obvious, that nature points out the proper time when a child ought to be weaned, by giving it teeth, and rendering it capable of motion ſufficient to comminute, and afterwards to digeſt an aliment more ſolid, and more difficult to diſſolve than its mother's milk.

As nature does wonderfully provide the infant, by degrees, with inſtruments of maſtication, and the power of uſing exerciſe, ſo does ſhe thereby point out that the tranſition ought to be gradual from milk to ſolid food. But as it is impoſſible to lay down rules for the weaning of children, adapted to every caſe that may occur; let regard be had to the health and ſtrength of the mother, as well as that of the child, purſuing as much as poſſible, the method which ſeems to be pointed out by nature. See INFANT.

WEAR, or WIER, a great ſtank or dam in a river, fitted for the taking of fiſh, or for conveying the ſtream to a mill.

New wears are not to be made, or others altered, to the nuiſance of the publick, under a certain penalty.

WEATHER, the ſtate or diſpoſition of the atmoſphere, with regard to heat, cold, wind, rain, froſt, &c.

As it is in the atmoſphere that all plants and animals live, and as that appears to be the great principle of moſt animal and vegetable productions, alterations, &c. there does not ſeem any thing, in all philoſophy, of more immediate concernment to us than the ſtate of the weather, and a knowledge of the great influence it has on our bodies. What vaſt, but regular alterations, a little turn of weather makes in a tube filled with mercury, or ſpirits of wine, or in a piece of ſtring, &c. every body knows, in the common inſtances of barometers, thermometers, &c. and it is owing partly to our inattention, and partly to our unequal and intemperate courſe of living, that we do not feel as great and regular alterations in the tubes, chords, and fibres of our own bodies.

WEATHERING,

WEATHERING, among sailors, signifies the doubling or sailing to windward of a head-land, or other place.

WEAVING, the art of working a web of cloth, silk, or other stuff, in a loom with a shuttle.

WEAVING-LOOM, a machine for weaving cloth, silk, &c. by raising the threads of the warp in order to throw in the shoot, and strike it close. Of these there are various kinds, distinguished by the different sorts of cloths, stuffs, silks, &c. in which they are employed, and which are chiefly distinguished by the number and variety of the threads they raise in order to work the warp, either plain or in figures, by making more or less of the woof or shoot appear through the warp.

WEB, a sort of tissue, or texture, formed of threads interwoven with each other; some whereof are extended in length, and called the warp; and others drawn across, and called the woof. See CLOTH, WARP, &c.

Spider's WEB. See SPIDER'*s Silk*.

WEDGE, *Cuneus*, one of the mechanical powers, as they are called.

The wedge is a triangular prism, whose bases are equilateral acute-angled triangles. See MECHANICAL *Powers*.

WEDNESDAY, the fourth day of the week, so called from a Saxon idol named Wooden, supposed to be Mars, worshipped on this day.

Ash-WEDNESDAY, the first day of Lent, so called from the custom observed in the ancient Christian church, of penitents expressing their humiliation at this time, by appearing in sackcloth and ashes.

WEED, a common name for all wild and rank herbs, that grow of themselves, to the detriment of other useful herbs they grow among.

WEED, in the miners language, denotes the degeneracy of a load, or vein, of fine metal, into an useless marcasite.

WEEK, in chronology, a division of time comprising seven days.

The origin of this division of weeks, or of computing time by sevenths, is greatly controverted. Some will have it to take its rise from the four quarters or intervals of the moon, between her changes or phases, which, being about seven days distance, gave occasion to the division.

Be this as it will, the division is certainly very ancient. The Syrians, Egyptians, and most of the oriental nations, appear to have used it from all antiquity: though it did not get footing in the west till Christianity established it; the Romans reckoned their days not by sevenths but by ninths, and the ancient Greeks by decads or tenths.

Indeed, the Jews divided their time by weeks, but it was upon a different principle from the eastern nations; God himself appointing them to work six days, and to rest the sabbath, in order to keep up the sense and remembrance of the creation; which being effected in six days, he rested the seventh.

Passion-WEEK, or the *Holy* WEEK, is the last week in Lent, wherein the church celebrates the mystery of our Saviour's death and passion.

WEIGH, WAY, or WEY, a weight or quantity of cheese, wool, &c. containing 256 pounds avoirdupoise. Of corn, the weigh contains forty bushels; of barley or malt six quarters. In some places, as Essex, the weigh of cheese is 300 pounds.

WEIGHER, an officer in divers cities appointed to weigh the commodities bought or sold in a publick balance.

WEIGHING, the act of examining a body in the balance to find its weight.

WEIGHING-CHAIR, a machine contrived by Sanctorius, to determine the quantity of food taken at a meal, and to warn the feeder when he had his quantum.

WEIGHING-*Anchor*, is the drawing it out of the ground it had been cast into, in order to set sail, or quit a port, road, or the like.

WEIGHT, gravity, *Pondus*, in physicks, a quality in natural bodies whereby they tend downwards, towards the centre of the earth.

Or, weight may be defined, in a less limited manner, to be a power inherent in all bodies, whereby they tend to some common point, called the centre of gravity; and that with a greater or less velocity, as they are more or less dense, or as the medium they pass through is more or less rare.

In the common use of language, weight and gravity are considered as one and the same thing. Some authors, however, make a difference between them; and hold gravity only to express a nisus, or endeavour to descend; but weight, an actual descent. But there is room for a better distinction. In effect, one may conceive gravity to be the quality as inherent in the body; and weight the same quality, exerting itself either against an obstacle, or otherwise. Hence, weight may be distinguished, like gravity, into absolute and specifick. See GRAVITY.

Sir Isaac Newton demonstrates, that the weights of all bodies, at equal distances from the centre of the earth, are proportionable to the quantities of matter each contains. Whence it follows, that the weights of bodies have not any dependance on their forms, or textures; and that all spaces are not equally full of matter. Hence, also, it follows, that the weight of the same body is different, on the surface of different parts of the earth; by reason its figure is not a sphere, but a spheroid. See the article EARTH.

WEIGHT, *Pondus*, in mechanicks, is any thing to be raised, sustained, or moved by a machine, or any thing that in any manner resists the motion to be produced.

WEIGHT, in commerce, denotes a body of a known weight, appointed to be put in the balance against other bodies, whose weight is required.

The security of commerce depending, in great measure, on the justness of weights, which are usually of lead, iron, or brass, most nations have taken care to prevent the falsification thereof, by stamping or marking them by proper officers, after being adjusted by some original standard. Thus, in England, the standard of weights is kept in the Exchequer, by a particular officer, called the clerk of the market.

Weights may be distinguished into ancient and modern, foreign and domestick.

Ancient WEIGHTS, 1. Those of the ancient Jews, reduced to the English troy-weights, will stand as in the following table:

			lb.	*oz.*	*dwt.*	*gr.*
Shekel			00	00	09	$02\frac{4}{7}$
60	Maneh		02	03	06	$10\frac{2}{7}$
3000	50	Talent.	113	10	01	$10\frac{2}{7}$

2. Grecian and Roman weights, reduced to English troy-weight, will stand as in the following table:

										oz.	*dwt.*	*gr.*
Lentes										00	00	$\frac{85}{112}$
4	Siliquæ									00	00	$03\frac{1}{28}$
12	3	Obolus								00	00	$09\frac{3}{28}$
24	6	2	Scriptulum							00	00	$18\frac{3}{14}$
72	18	6	3	Drachma						00	00	$06\frac{9}{14}$
96	24	8	4	$1\frac{1}{3}$	Sextula					00	03	$00\frac{6}{7}$
144	36	12	6	2	$1\frac{1}{2}$	Sicilicus				00	04	$13\frac{2}{7}$
192	48	16	8	$2\frac{2}{3}$	2	$1\frac{1}{3}$	Duella			00	06	$01\frac{5}{7}$
576	144	48	24	8	6	4	3	Uncia		00	18	$05\frac{1}{7}$
6912	1728	576	288	96	72	48	36	12	Libra.	10	18	$13\frac{5}{7}$

The Roman ounce is the English avoirdupois ounce, which they divided into several denarii, as well as eight drachms: and since they reckoned their denarius equal to the Attick drachm, this will make the Attick weights one-eighth heavier than the corresponding Roman weights.

Modern European WEIGHTS. 1. English weights: By the twenty-seventh chapter of Magna Charta, the weights all over England are to be the same; but for different commodities, there are two different sorts, viz. avoirdupois-weight and troy-weight. The origin from which they are both raised, is a grain of wheat, gathered in the middle of the ear.

In troy-weight, 24 of these grains make one penny-weight sterling; 20 penny-weights make one ounce; and 12 ounces one pound.

By this weight we weigh gold, silver, jewels, grains, and liquors. The apothecaries also use the troy pound, ounce, and grain; but they differ from the rest in the intermediate divisions. They divide the ounce into eight drachms;

drachms; the drachm into three fcruples, and the fcruple into 20 grains.

In avoirdupois-weight, the pound contains 16 ounces; but the ounce is lefs, by near one-twelfth, than the troy ounce; this latter containing 490 grains, and the former only 448. The ounce contains 16 drachms. 80 ounces avoirdupois are only equal to 73 ounces troy; and 17 pounds troy equal to 14 pounds avoirdupois.

By avoirdupois-weight are weighed mercury and grocery wares, bafe metals, wool, tallow, hemp, drugs, bread, &c.

Table of Troy-WEIGHT, *as ufed by the Goldfmiths.*

Grains			
24	Penny-weight		
480	20	Ounce	
5760	240	12	Pound.

Table of Troy-WEIGHT, *as ufed by the Apothecaries.*

Grains				
20	Scruple			
60	3	Drachm		
480	24	8	Ounce	
4760	288	96	12	Pound.

Table of Avoirdupois-WEIGHT.

Scruples					
3	Drachm				
24	8	Ounce			
384	128	16	Pound		
43008	14336	1792	112	Quintal, or Hundred	
860100	286720	35840	2240	20	Ton.

The moneyers, jewellers, &c. have a particular clafs of weights, for gold and precious ftones, viz. caract and grain; and for filver, the penny-weight and grain. See CARACT.

The moneyers have alfo a peculiar fubdivifion of the grain troy, viz.

The	Grain	into	20 Mites,
	Mite		24 Droits,
	Droit		20 Perits,
	Perit		24 Blanks.

The dealers in wool have likewife a particular fet of weights, viz. the fack, weigh, tod, ftone, and clove.

2. French weights: the common or Paris pound is 16 ounces; which they divide two ways: the firft divifion is into 2 marcs; the marc into 8 ounces, the ounce into 8 grofs; the grofs into 3 penny-weights; the penny-weights into 24 grains; the grain equal to a grain of wheat. The fecond divifion of the pound is into 2 half pounds; the half pound into 2 quarters; the quarter into 2 half quarters; the half quarter into 2 ounces; and the ounce into 2 half ounces.

The weights of the firft divifion are ufed to weigh gold, filver, and the richer commodities; and the weights of the fecond divifion, for commodities of lefs value.

Grains					
24	Penny-weight				
72	3	Grofs			
576	24	8	Ounce		
4608	192	64	8	Marc	
9216	384	128	16	2	Pound.

Half ounce						
2	Ounce					
4	2	Half-quarter pound				
8	4	2	Quarter pound			
16	8	4	2	Half pound		
32	16	8	4	2	Pound	
3200	1600	800	400	200	100	Quintal.

But the pound is not the fame throughout France: At Lyons the city pound is only 14 ounces; fo that 100 Lyons pounds make only 88 Paris pounds. But befide the city pound, they have another at Lyons for filk, containing 16 ounces. At Tholoufe, and throughout the Upper-Languedock, the pound is 13 ounces and a half of Paris weight. At Rouen, befide the common Paris pound and marc, they have the weight of the vicompte; which is 16 ounces, a half, and five-fixths of the Paris weight.

The weights, enumerated under the two articles of Englifh and French weights, are the fame that are ufed throughout the greateft part of Europe; only under fomewhat different names, divifions, and proportions.

Particular nations have alfo certain weights peculiar to themfelves: thus Spain has its arrobas, containing 25 Spanifh pounds, or one-fourth of the common quintal: its quintal macho, containing 150 pounds, or one-half common quintal, or 6 arrobas: its adarme, containing one-fixteenth of its ounce. And for gold, it has its caftillan, or one-hundredth of a pound: its tomin, containing 12 grains, or one-eighth of a caftillan. The fame are in ufe in the Spanifh Weft Indies.

Portugal has its arroba, containing 32 Lifbon arratels, or pounds. Savary alfo mentions its faratelle, containing 2 Lifbon pounds; and its rottoli, containing about 12 pounds. And for gold, its chego, containing 4 carats. The fame are ufed in the Portuguefe Eaft Indies.

Italy, and particularly Venice, have their migliaro, containing four mirres; the mirre, containing 30 Venice pounds: the faggio, containing a fixth part of an ounce.

Genoa has five kinds of weights, viz. large weights, whereby all merchandizes are weighed at the cuftom-houfe; cafh-weights for piaftres, and other fpecies: the cantara, or quintal, for the coarfeft commodities: the large balance for raw filks; and the fmall balance for the finer commodities. Sicily has its rotollo, 32 and a half pounds of Meffina.

Germany, Flanders, Holland, the Hanfe-Towns, Sweden, Denmark, Poland, &c. have their fchippondt, which at Antwerp and Hamburgh, is 300 pounds; at Lubeck, 320; and at Coningfberg, 400 pounds. In Sweden, the fchippondt for copper is 320 pounds; and the fchippondt for provifions 400 pounds. At Riga and Revel, the fchippondt is 400 pounds; at Dantzick, 340 pounds; in Norway, 300 pounds; at Amfterdam, 300; containing 20 lyfpondts, each weighing 15 pounds.

In Mufcovy, they weigh their large commodities by the bercheroct, or berkewits, containing 400 of their pounds. They have alfo the poet, or poede, containing 40 pounds, or one-tenth of the bercheroct.

In order to fhew the proportion of the feveral weights ufed throughout Europe, we fhall add a reduction of them to one ftandard, viz. the London.

Proportion of the weights of the principal places of Europe.

The 100*lb.* of England, Scotland, and Ireland, are equal to

lb.	*oz.*	
91	8	of Amfterdam, Paris, &c.
96	8	of Antwerp or Brabant
88	0	of Rouen, the vifcounty weight
106	0	of Lyons, the city weight
90	9	of Rochelle
107	11	of Touloufe, and Upper-Languedock
113	0	of Marfeilles or Provence
81	7	of Geneva
93	5	of Hamburgh
89	7	of Francfort, &c.
96	1	of Leipfick, &c.
137	4	of Genoa
132	11	of Leghorn
153	11	of Milan
152	0	of Venice
154	10	of Naples
97	0	of Seville, Cadiz, &c.
104	13	of Portugal
96	5	of Leige
112	$\frac{2}{3}$	of Ruffia
107	$\frac{1}{24}$	of Sweden
89	$\frac{1}{2}$	of Denmark.

WELD, or dyers-weed, *Luteola*, in botany, a plant whofe

whose root is single, white, and woody, with a few fibres; the leaves are oblong, narrow, smooth and entire; among these rise stalks to the height of three feet; these are round, hard, smooth, greenish, branched and furnished with leaves that are less than those below. The flowers are produced on the tops of the stalks; they are of a beautiful yellowish green colour, and of the same form as those of the reseda, of which it is now held a species.

It is very common in England, and grows upon dry banks, and on the tops of walls and buildings.

The seeds of weld should be sown in August, soon after they are ripe, they will come up the first moist weather, and will grow very strong the same autumn, provided they are sown by themselves. When they are pretty strong, they should be hoed out, as is practised with turneps, to destroy the weeds, and to thin them where too thick. The seed must not be too ripe when gathered, for then it will fall out; nor yet must the stalk be unripe, for then it will be good for nothing. It must be bound in handfuls, and set to dry like flax, taking care not to shake out the seeds, which are usually sold at ten shillings a bushel; and a gallon will sow an acre.

It is of great use among the dyers, for dying bright yellow and lemon colours; a great quantity of it is sown in some parts of Kent; and they cultivate it in Languedock and Normandy in France, where they boil it in water, with allum, and then it will colour white wool yellow, and blue stuffs green.

WELDING-Heat, in smithery, a degree of heat given to iron, &c. sufficient only for bending, or doubling it up.

WELL, a hole under ground, usually of a cylindrical form, walled with stone and mortar: its use is to collect the water of the strata around it.

Well, in the military art, a depth which the miner sinks under ground, with branches or galleries running out from it; either to prepare a mine, or to discover and disappoint the enemy's mine.

Well-Hole, in building, is the hole left in a floor for the stairs to come up through. See Stairs.

WEN, a tumour or excrescence that arises on different parts of the body, and contains a cystus, or bag filled with some peculiar matter, of which physicians reckon three kinds, viz. when this matter is soft, resembling pulp, the wen is called atheroma; if like honey, meliceris; and if like suet, steatoma. See Tumour.

WERE, in our old law-books, denotes a sum paid for killing a person, when such crimes were punished with pecuniary mulct, and not death.

WERELADA, among our Saxon ancestors, the denying an homicide on oath, in order to be quit of the fine called Were.

WERGILD, or Weregeld, in our ancient customs, the price of a man's head; a part of which was paid to the king, for the loss of his subject, a part to the lord whose vassal he was, and a part to the nearest relation of the person slain.

WEST, in cosmography, one of the cardinal points of the horizon, diametrically opposite to the east; and strictly defined, the intersection of the prime vertical with the horizon, on that side the sun sets it. See the article Horizon.

WHALE, *Balæna*, in ichthyology, the name of a fish, which grows to a monstrous size; the head is extremely large, and of an irregular figure, the lower jaw is much larger than the upper, and covers it at the sides; the upper, is narrow and oblong, the fistula is double, or has two distinct apertures, and is situated in the middle of the head, between the eyes; the eyes are very small in proportion to the enormous bulk of the head, and are placed a great distance from one another; the whole head is somewhat depressed, and has several irregularities on its surface; the body is very thick, and somewhat rounded; but towards the extremity of the back, there is a subacute angle, extending itself longitudinally to the tail; the tail is somewhat forked, very large, and in its horizontal situation makes a very singular figure. It is an inhabitant of the northern seas, the principal object of the Greenland fishery.

Whale-Bone, or as it is otherwise called, whale-fins, in commerce, a commodity procured from the whale; used as stiffening in stays, fans, busks, skreens, &c. What we call whale-bone, or fins, is a horny laminæ in the upper jaw of the balæna, which supply the place of teeth, but there are none such in the lower-jaw. These laminæ are commonly called whiskers, which, split and fashioned, are the whale-bone. The pizzle, or genital member of the animal, serves likewise for the same purpose.

WHARF, a space on the banks of a haven, creek, or hithe, provided for the convenient loading and unloading vessels upon.

The fee paid for the landing of goods on a wharf, or for shipping them off, is called wharfage, and the person who has the direction and oversight of the wharf, receives wharfage, &c. is called the wharfinger.

WHEAT, *Triticum*, in botany, a genus of plants, the corolla of which consists of two valves, nearly equal in size, and of the bigness of those which form the cup; the exterior valve is bellied, with an obtuse end terminated by a point, and the inner valve is plane; the stamina are three capillary filaments, topped with oblong bifurcate antheræ; the pistillum consists of a turbinated germen, supporting two hairy reflexed styles, each crowned with a plumose stigma: there is no pericarpium, the corolla inclosing the seed, which is single, of an ovato-oblong form, blunt at the ends, convex on one side, and furrowed on the other.

There are several kinds of wheat; as the white or red wheat without awns; the red-eared, the bearded wheat, the cone wheat, grey wheat, or ducks-bill wheat, Poland wheat, many-eared wheat, summer wheat, long-grained wheat, white-eared wheat, naked barley-wheat, with some other sorts. The season for sowing wheat is in autumn, and the earlier the better, if the weather is moist, as less seed is required to an acre than when it is sown late, because less of it will die; and poor land should always be allowed more seed than rich, because a greater number of the plants will perish on such land than on the other. Another thing to be considered in order to find the proper quantity of seed, is, that some kinds of wheat have their grains twice as large as others; in this case, a bushel containing but half the number of grains that it does in the small-grained wheat, one bushel of the small-grained will plant just as much as two bushels of this; therefore the size of the seeds ought to be regarded as well as the measure.

It might be supposed, that a large-grained wheat will produce larger and finer plants than the small-grained sort, but experiments have proved that there is nothing in this, for the smallest grained wheat produces fully as large plants as the other. The usual allowance of seed-wheat to one acre of land, is three bushels; but, from repeated trials, it has been found that half that quantity is sufficient; therefore if the farmers have regard to their own interest, they should save this expence of seed, which amounts to a considerable article in large farms, especially when it is to be purchased, which most skilful farmers do at least every year, by way of change; for they find that the seeds continued long upon the same land, will not succeed so well as when they procure a change of seeds from a distant country: and in the choice of the seed, particular regard should be had to the land on which it grew, for if it is light land, the wheat which grew upon strong land is the best, and vice versa.

Poor light land must be extremely well manured, in order to the maintaining wheat a year, the usual time it is on it, if the wheat is sown in the common broad-cast way; and if it be sown late, the greater part of it perishes, not being able to survive the winter while so poor and on such land: and if it be sown in the same manner very early on strong rich land, many of the plants are destroyed. But the new method of horse-hoeing gives both to strong and to light land all the advantages necessary, and takes off all the disadvantages of both; by this method the strong land may be planted with wheat as early as the light, if plowed dry; and the hoe-plough, if rightly applied, will be able to give it nourishment almost equal to that of dung in both sorts of land.

The use of wheat is universal, it making better bread than any other corn, being more glutinous and nutritious.

However, in the eastern countries they generally prefer rice thereto, for which reason it is not so much cultivated there, especially among the original inhabitants; not but it will grow well; for it has been justly observed,

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by the ancients as well as moderns, that wheat will grow in almoſt any part of the world; and that as it is the plant moſt neceſſary to mankind, ſo it is the moſt general and the moſt fruitful. It grows well not only in the temperate climates, but in the very hot and very cold ones; and when in places where it never grew ſpontaneouſly, ſucceeds as well as where it has been always common. But where it was originally a native it is not eaſy to determine, though it is generally ſuppoſed that ſome part of Africa is the country, becauſe in the earlieſt accounts we have of it, there is mention of its being tranſported from thence to other countries; and Sicily was the firſt country in Europe where this grain was cultivated.

The price of wheat in this country varies continually, and this variation is often very great in the ſpace of one or two years; ſo that from being ſo cheap as that the farmers could not pay their rents, in the compaſs of a year or two the price has been doubled; for one or two plentiful harveſts have lowered the price of wheat ſo much, as to make it difficult to the needy farmer to go on with his buſineſs, who wants ready money for his crops as ſoon as he can prepare them for market. This has eſtabliſhed a ſet of people called dealers in corn, who have taken the advantage of the farmer's neceſſity, and engroſſed their corn to keep it for better markets; and theſe dealers have of late years increaſed ſo greatly in their numbers, to the great prejudice of the raiſers and conſumers of corn, as may in time prove of the worſt conſequence, by monopolizing the greateſt part of the produce, and then ſet their own price upon it; ſo that between corn-factors, as they are called, and the diſtillers, together with the monopolizers of farms, the price of bread may be too great for the labouring poor; which is a conſideration that requires more publick attention than it has hitherto met with.

White-Cone WHEAT, a term uſed by our huſbandmen to expreſs a peculiar kind of wheat, which is very ſtrong, and has a large ear.

It is the beſt kind for ſowing in fields ſubject to the blight; for the ſtalks of it being, for the moſt part, ſolid or full of pitch like a ruſh, not hollow like thoſe of common wheat; the inſects that cauſe the blight ſeizing on the ſtalks of other wheat, does this no injury, even though they ſhould attack it; the ſtalks of this kind being often found full of black ſpecks, which are always the marks of the inſect having been there, and yet the ear full, and the grain good.

This wheat makes very good bread, if the miller does not grind it too ſmall, or the baker make his dough too hard; it requiring to be ſomewhat larger than other wheat flour, and ſomewhat ſofter in the dough. A buſhel of white cone-wheat will make conſiderably more bread than a buſhel of lammas-wheat; but it gives it ſomewhat of a yellowiſh caſt.

Smyrna-WHEAT, a peculiar kind of wheat that has an extremely large ear, with many leſſer or collateral ears coming all round the bottom of the great one.

As this is the largeſt of all ſorts of wheat, ſo it will diſpenſe with the nouriſhment of a garden, without being over fed, and requires more nouriſhment than common huſbandry in the large way can give it. In the common way, its ears grow not much larger than thoſe of the common wheat.

This ſort of wheat ſeems, of all others, the moſt proper for the new method of horſe-hoeing huſbandry, as that method ſeems capable of giving as much nouriſhment as the farmer pleaſes, by often repeating the hoeing. Next to this, the white-cone wheat is beſt for this ſort of huſbandry, than the grey-cone wheat.

WHEAT-EAR, in ornithology, the Engliſh name of a ſpecies of motacilla, with a grey, black, and white forehead.

WHEEL, *Rota*, in mechanicks, a ſimple machine, conſiſting of a round piece of wood, metal, or other matter which revolves on an axis. The wheel is one of the principal mechanick powers; it has place in moſt engines; in effect, it is of an aſſemblage of wheels that moſt of our engines are compoſed.

With regard to the wheels of coaches, waggons, &c. otherwiſe called wheel-carriages, the whole doctrine thereof may be reduced to the following particulars; viz. 1. Wheel-carriages meet with leſs reſiſtance than any other. 2. The larger the wheel, the eaſier is the draught of the carriage. 3. A carriage upon four wheels of equal ſize, is drawn with leſs force than with two of theſe wheels and two of a leſſer ſize. 4. If the load be laid on the axle of the larger wheels, it will be drawn with leſs force than if it had laid on the axis of the leſſer wheels, contrary to the common notion of loading carriages before. 5. The carriage goes with much leſs force on friction wheels than in the common way. The wheels of carriages muſt be exactly round, and the fellies ſhould be at right angles to the naves, according to the inclination of the ſpokes; that is, the plane of the curvature of the wheel ſhould cut the nave at right angles though it need not paſs through the ſpace where the ſpokes are inſerted into the nave. 1. It is a general rule in all caſes that the wheels be exactly round; for if they were not ſo, and the nave out of the centre, it is certain that ſuch a wheel in turning, would be affected in the ſame manner upon plane ground as other wheels are when they riſe and fall, and would not be in equilibrio.

2. The fellies muſt not croſs wind, but be at right-angles with the naves, according to the inclination of the ſpokes; for otherwiſe the wheel, in turning, would find inequalities, as it happens when the whole of the nave is too big, and the wheel moves from ſide to ſide; which comes to the ſame purpoſe as if the wheel was out of round; and when the inequality of the ſpokes, which would be too leaning or too ſtraight, upon the nave deſcending into a hole, or riſing upon an eminence, oppoſite to their inclination, would cauſe them, or the fellies, to break.

3. The ſpokes muſt be inclined to the naves, that the wheels may be diſhing or concave. If the wheels always turned upon a ſmooth and even ground, it is certain that the ſpokes ought to be ſtraight upon the naves; that is, at right-angles to their axes; becauſe then they would bear perpendicularly, which is the ſtrongeſt way for wood.

But becauſe the ground is unequal, and when the wheels fall into the ruts, that wheel which is in the rut bears a greater part of the weight than the other, becauſe it is lower: in ſuch caſe, the ſpokes of a diſhing-wheel become perpendicular in the rut, and therefore have the greateſt ſtrength; whilſt the oppoſite wheel, being upon higher ground, bears a leſs part of the weight; and conſequently, the ſpokes need not be at their full ſtrength, and ſo will have a ſufficient force, though that force be leſs than what they have upon even ground.

4. The axle-tree muſt be ſtraight in all reſpects, and at right-angles to the ſhafts of the pole. In the motion of all bodies, there is one way of moving, which is the eaſieſt of all the reſt, and happens here when the axle-tree is every way ſtraight; for if its ends ſhould bend backwards, ſo as to bring the wheels nearer together behind, and ſpread them much before, it is certain that they could not go into the ruts, nor turn in going forward, or at leaſt with great difficulty, dragging inſtead of rolling.

There would be the ſame inconveniencies in bending the axle-tree forward, ſo as to bring them nearer the pole and make them ſpread behind.

The leſs the axle-tree is bent, the leſs the inconveniency; but there will always be ſome, when the wheels are not parallel, and there will be no inconveniency when the axle is ſtraight. The axle muſt alſo be at right-angles to the pole or ſhafts; for if the pole or ſhafts were on one ſide, the carriage would be drawn on one ſide, and almoſt all the weight would bear upon one horſe.

5. Great wheels are always more advantageous for rolling than little ones, in any caſe, or upon any ground whatſoever. The wheels of carriages are conſidered according to the velocity and friction they have upon the axle-tree, and likewiſe according to their reſiſtance, or ſinking in upon the ground.

If we conſider them according to the friction, it is certain, that a wheel whoſe diameter is double that of another, will make but one turn, whilſt the little one makes two for the ſame length of way; the circumference, which is in proportion to the diameter, being double. Therefore, in reſpect to friction, a wheel of double the diameter will have double the advantage, there being but one turn inſtead of two, which doubles the friction in the ſmall wheel.

If we conſider the wheels according as they ſink into the

the earth, or fall into holes, there will be the fame advantage for one, and inconveniency for the other. If we confider the bearing, it is double in the great wheel; therefore it will fink but half the way; and if we confider hollows, it will give the fame advantage in fome cafes; but then, in others, as, for example, where the holes are deep, the little wheel will have much more difadvantage.

We may fuppofe the fame to happen in marfhy grounds, where a little wheel would fink wholly in the fame hole that a great one would fink but in part.

The advantage then of high wheels is, that they pafs the rubs moft eafily, have the lefs friction, fink lefs in the dirt, and more eafily prefs down an obftacle; and their difadvantage is, that they eafily overturn, and make cattle draw too high; for they can apply their ftrength beft when they draw low and upwards, which is the advantage of low wheels; yet if the wheels are high, they may be made to draw low, by fixing the limmers or traces as far below the axle as you will, which will then be an equal advantage with low wheels: for the power not pulling at the wheel, but at the carriage, may draw from any part of it. There is another advantage, which is, that they are better to turn with.

A waggon with four wheels is more advantageous than a cart with two wheels, efpecially on fand, clay, &c. Narrow wheels and narrow plates are a difadvantage.

6. It would be much more advantageous to make the four wheels of a coach or waggon large, and nearly of a height, than to make the fore-wheels of only half the diameter of the hind-wheels, as is ufual in many places.

Wheel is alfo the name of a kind of punifhment which great criminals are put to in divers countries. In France, their affaffins, parricides, and robbers on the highway, are condemned to the wheel; i. e. to have their bones firft broken with an iron bar on a fcaffold, and thus to be expofed and left to expire on the circumference of a wheel. In Germany they break their bones on the wheel itfelf.

Wheel, in the military art, is the word of command, when a battalion or fquadron is to alter its front either one way or the other. To wheel to the right directs the man in the right angle to turn very flowly, and every one to wheel from the left to the right, regarding him as their centre; and *vice verfa*, when they are to wheel to the left. When a divifion of men are on the march, if the word be to wheel to the right or to the left, then the right or left hand man keeps his ground; only turning on his heel, and the reft of the rank move about quick till they make an even line with the faid right or left-hand man.

WHEEZING, the name of a diftemper in horfes, accounted by the generality of people to be the fame with that called purfivenefs.

WHELP, the young of a dog, fox, lion, or any wild beaft.

Whelps, in a fhip, the feaman's term for thofe brackets which are fet up on the capftan clofe under the bars; they give the fweep to it, and are fo contrived, that the cable winding about them may not furge fo much as it might otherwife do, if the body of the capftan were quite round and fmooth.

WHETSTONE, a ftone which ferves for the whetting of knives and other tools upon.

WHEY, the ferum, or watery part of milk.

WHIG, a party in England oppofite to the tories, from whom they differ chiefly in their political principles.

WHIN, a name ufed in the northern parts of England for the ulex, or furze.

WHIP, or Whip-Staff, in a fhip, a piece of timber, in form of a ftrong ftaff, faftened into the helm, for the fteerfman, in fmall fhips, to hold in his hand, in order to move the rudder and direct the fhip.

Whip-Grafting. See Grafting.

WHIRL-Pool, an eddy, vortex, or gulph, where the water is continually turning round. In rivers thefe are very common, from various accidents, and are ufually very trivial, and of little confequence. In the fea they are more rare, but more dangerous.

Sibbald has related the effects of a very remarkable marine whirl-pool among the Orcades, which would prove very dangerous to ftrangers, though it is of no confequence to the people who are ufed to it. This is

not fixed to any particular place, but appears in various parts of the limits of the fea among thofe iflands. Wherever it appears it is very furious; and boats, &c. would inevitably be drawn in and perifh with it; but the people who navigate them are prepared for it, and always carry an empty cafk, a log of wood, a large bundle of ftraw, or fome fuch thing, in the boat with them: as foon as they perceive the whirlpool, they tofs this within its vortex, keeping themfelves without it. This fubftance, whatever it be, is immediately received into the centre, and carried under water; and as foon as this is done, the furface of the place where the whirlpool was, becomes fmooth, and they row over it with fafety; and in about an hour they fee the vortex begin again in fome other place, ufually at about a mile diftant from the firft.

WHIRLWIND, a wind that rifes fuddenly, exceeding rapid and impetuous when rifen, but foon fpent. It turns rapidly every way, and fweeps all round the place. It ufually defcends from the clouds. It is frequent in the Eaftern Ocean, chiefly about Siam, China, &c. and renders the navigation of thofe parts exceeding dangerous.

WHISPERING Places, depend upon this principle: if the vibrations of the tremulous body are propagated through a long tube, they will be continually reverberated from the fides of the tube into its axis, and by that means prevented from fpreading, till they get out of it; whereby they will be exceedingly increafed, and the found rendered much louder than it otherwife would be.

Hence it is, that found is conveyed from one fide of a whifpering gallery to the oppofite one, without being perceived by thofe who ftand in the middle.

The form of a whifpering-gallery is that of a fegment of a fphere, or the like arched figure. Accordingly, all the contrivance in whifpering places is, that near the perfon that whifpers there may be a fmooth wall, arched either cylindrically or elliptically. A circular arch will do, but not fo well.

The moft confiderable whifpering places in England are, the whifpering-gallery in the dome of St. Paul's, London, where the ticking of a watch may be heard from fide to fide, and a very eafy whifper be fent all round the dome. The famous whifpering place in Gloucefter cathedral, is no other than a gallery above the eaft end of the choir, leading from one fide thereof to the other. It confifts of five angles and fix fides, the middlemoft of which is a naked window, yet two whifperers hear each other at the diftance of twenty-five yards.

WHITE, one of the colours of natural bodies.

White is not fo properly faid to be any one colour, as a compofition of all colours; for it is demonftrated by Sir Ifaac Newton, that thofe bodies only appear white, which reflect all the kinds of coloured rays alike.

White, in painting in miniature, &c. The beft white for painting in water-colours, is flake white, which is better than white lead; and if it be pure, far exceeds it in beauty; becaufe white lead is apt to turn blackifh, efpecially if it be ufed in a hard water: but if you ufe white lead, firft rectify it with white-wine vinegar in the following manner: grind well the fineft white lead upon a porphyry with vinegar; then put it into a glafs of water, ftir it about, and prefently pour off the water, while it is white, into fome other clean glafs, or veffel; let it fettle, and then pour off the water from it, and it will be exceeding fine. When this white is fettled, put to it gum water, to bind it, and to give it a glaze.

Some recommend a white made of the whiter part of oyfter fhells, reduced into an impalpable powder; this is called pearl-white, and will mix with any colour. Some alfo recommend the powder of egg-fhells of the brighteft colour, and well cleaned and wafhed, ground with gum-water, to which may be added about a twentieth part of white fugar-candy: the egg-fhells fhould be ground to an impalpable powder.

Experience fhews, that egg-fhell powder is of very great fervice as a white in water-colours, and both that and the powder of oyfter-fhells, well rectified and mixed with the white of an egg well beat, will make an extraordinary mixture in other colours, and will correct them from changing or altering their qualities.

WHITE *of the Eye*, denotes the firſt tunick or coat of the eye, called albuginea and conjunctiva, becauſe it ſerves to bind together or incloſe the reſt. See the article EYE.

WHITE-HART-SILVER, a mulct or tribute paid into the Exchequer, out of certain lands in or near the foreſt of White-hart in Dorſetſhire; impoſed by Henry III. upon Thomas de la Linde, for killing a beautiful white hart which that prince had before ſpared in hunting.

WHITE-LEAD, alſo called ceruſe. See CERUSE.

WHITE-LINE, among printers, a void ſpace of the depth or breadth of a line. See PRINTING.

WHITENESS, *Albedo*, the quality which denominates a body white. Sir Iſaac Newton ſhews, that whiteneſs conſiſts in a mixture of all the colours; and that the light of the ſun is only white becauſe conſiſting of rays of all colours.

From the multitude of rings of colours which appear, upon compreſſing two priſms or object-glaſſes of teleſcopes together, it is manifeſt that theſe do ſo interfere and mingle with one another at laſt, as, after eight or nine reflections, to dilute one another wholly, and conſtitute an even and uniform whiteneſs; whence, as well as from other experiments, it appears, that whiteneſs is certainly a mixture of all colours, and that the light which conveys it to the eye, is a mixture of rays endued with all thoſe colours.

The ſame author ſhews, that whiteneſs, if it be ſtrong and luminous, is to be reckoned of the firſt order of colours; but if leſs, as a mixture of the colours of ſeveral orders. Of the former ſort, he reckons white metals; and of the latter, the whiteneſs of froth, paper, linen, and moſt other white ſubſtances. And as the white of the firſt order is the ſtrongeſt that can be made by plates or tranſparent ſubſtances, ſo it ought to be ſtronger in the denſer ſubſtances of metals, than in the rarer ones of air, water, and glaſs.

Gold, or copper, mixed either by fuſion or amalgamation, with a very little mercury, with ſilver, tin, or regulus of antimony, becomes white; which ſhews both that the particles of white metals have much more ſurface, and therefore are ſmaller than thoſe of gold and copper; and alſo, that they are ſo opake as not to ſuffer the particles of gold or copper to ſhine through them. And as that author doubts not but that the colours of gold and copper are of the ſecond and third order, therefore the particles of white metals cannot be much bigger than is requiſite to make them reflect the white of the firſt order.

WHITING, in ichthyology, the Engliſh name for the white gadus with no beard, with three fins on the back, and the upper jaw longeſt.

WHITING-POLLOCK, in ichthyology, a ſpecies of gadus with three back fins, the lower jaw longeſt, and the lateral line crooked. The uſual length of this fiſh is from eight to thirteen inches; it is conſiderably thick in proportion, and in moſt other reſpects reſembles the common whiting.

WHITLOW, in medicine. See PARONICHIA.

WHITSUNDAY, a ſolemn feſtival of the Chriſtian church, obſerved on the fiftieth day after Eaſter, in memory of the deſcent of the Holy Ghoſt upon the apoſtles, in the viſible appearance of fiery cloven tongues, and of thoſe miraculous powers which were then conferred upon them.

It is called Whitſunday, or White-ſunday, becauſe this being one of the ſtated times for baptiſm in the ancient church, thoſe who were baptized put on white garments, as types of that ſpiritual purity they received in baptiſm. As the deſcent of the Holy Ghoſt upon the apoſtles happened upon the day which the Jews call Pentecoſt, this feſtival retained the name of Pentecoſt among the Chriſtians. See PENTECOST.

WHOODINGS, or HOODINGS, a ſea term, uſed for planks joined and faſtened along the ſhip's ſides into the ſtem.

WHORLBAT, or HURLBAT, a kind of gauntlet, or leathern ſtrap, loaden with plummets; uſed by the ancient Romans in their ſolemn games and exerciſes, and by them called cæſtus.

WHORTLE-BERRY, in botany. See VACCINIUM.

WICK, a place on the ſea-ſhore, or on the bank of a river; though it properly ſignifies a town, village, or dwelling place; and ſometimes a machine.

WICKER, a twig of the oſier ſhrub, ſingle or wrought.

WICKET, a ſmall door in the gate of a fortified place, or a hole in a door, through which to view what paſſes without.

WICKLIFFISTS, or WICKLIFFITES, a religious ſect, which ſprung up in England in the reign of Edward III. and took its name from John Wickliffe, doctor and profeſſor of divinity in the univerſity of Oxford, who maintained that the ſubſtance of the ſacramental bread and wine remained unaltered after conſecration; and oppoſed the doctrine of purgatory, indulgences, auricular confeſſion, the invocation of ſaints, and the worſhip of images.

He maintained, that the children of the religious may be ſaved without being baptized; that prieſts may adminiſter confirmation; that there ought to be only two orders in the church, that of prieſts, and that of deacons. He made an Engliſh verſion of the Bible, and compoſed two volumes, called Alethiea, i. e. Truth; from which John Huſs learned moſt of his doctrines. In ſhort, to this reformer we owe the firſt hint of the reformation, which was effected about two hundred years after *.

WIDOW, a woman who has loſt her huſband. In London, a freeman's widow may exerciſe her huſband's trade, as long as ſhe continues ſuch.

Marriage with a widow, in the eye of the canon law, is a kind of bigamy.

WIDOW *of the King*, was ſhe who after her huſband's death, being the king's tenant in capite, could not marry again without the king's conſent.

WIFE, a married woman, or one joined with, and under the protection of, an huſband.

Mid-WIFRY, is the art of aſſiſting nature in bringing forth a perfect fœtus, or child, from the womb of the mother. The knowledge of this art depends greatly on an intimate acquaintance with the anatomy of the parts of generation in women, both internal and external. We muſt therefore refer to the different parts of that ſcience upon which the knowledge of midwifry depends. See ANATOMY, PELVIS, GENERATION, FOETUS, UTERUS, &c.

Of the increaſe of the *Uterus* after conception. It is ſuppoſed, that the ovum ſwims in a fluid, which it abſorbes ſo as to increaſe gradually in magnitude, till it comes in contact with all the inner ſurface of the fundus uteri; and this being diſtended in proportion to the augmentation of its contents, the upper part of the neck begins alſo to be ſtretched.

About the third month of geſtation, the ovum in bigneſs equals a gooſe egg; and then nearly one fourth of the neck, at its upper part, is diſtended equal with the fundus. At the fifth month, the fundus is increaſed to a much greater magnitude, and riſes upwards to the middle ſpace betwixt the upper part of the pubes and the navel; and at that period, one half of the neck is extended. At the ſeventh month, the fundus reaches as high as the navel; at the eighth month, it is advanced midway between the navel and ſcrobiculus cordis; and in the ninth month, is raiſed quite up to this laſt mentioned part, the neck of the womb being then altogether diſtended.

Now that the whole ſubſtance of the uterus is ſtretched, the neck and os internum, which were at firſt the ſtrongeſt, become the weakeſt part of the womb, and the ſtretching force being ſtill continued by the increaſe of the fœtus and ſecundines, which are extended by the incloſed waters in a globular form, the os uteri begins gradually to give way. In the beginning of its dilatation, the nervous fibres in this place, being more ſenſible than any other part of the uterus, are irritated, and yield an uneaſy ſenſation; to alleviate which, the woman ſqueezes

* For a more particular account of Wickliffe and his followers, ſee his life in the BIOGRAPHIA EVANGELICA, juſt publiſhed by the Rev. *Eraſmus Middleton*, and fold in numbers, (price ſix-pence, with an elegant engraving in each number) by the publiſher of this work. In this important work, the lives, characters, and writings, of the moſt illuſtrious reformers and divines are exhibited; from which our readers will be able to trace the nature and progreſs of the REFORMATION, in the moſt agreeable and entertaining manner, from the days of Wickliffe to the preſent time.

her uterus, by contracting the abdominal muſcles, and at the ſame time filling the lungs with air, by which the diaphragm is kept down; the pain being rather increaſed than abated by this ſtraining, is communicated to all the neighbouring parts, to which the ligaments and veſſels are attached, ſuch as the back, loins, and inſide of the thighs; and by this compreſſion of the uterus, the waters and membranes are ſqueezed againſt the os uteri, which is, of conſequence, a little more opened.

The woman being unable to continue this effort, for any length of time, from the violence of the pain it occaſions, and the ſtrength of the muſcles being thereby a little exhauſted and impaired, the contracting force abates; the tenſion of the os tincæ being taken off, it becomes more ſoft, and contracts a little; ſo that the nervous fibres are relaxed. This remiſſion of pain the patient enjoys for ſome time, until the ſame increaſing force renews the ſtretching pains, irritation, and ſomething like a teneſmus at the os uteri; the compreſſion of the womb again takes place, and the internal mouth is a little more dilated, either by the preſſure of the waters and membranes, or when the fluid is in ſmall quantity, by the child's head forced down by the contraction of the uterus, which in that caſe is in contact with the body of the fœtus.

In this manner the labour-pains begin, and continue to return periodically, growing ſtronger and more frequent, until the os uteri is fully dilated, and the membranes are depreſſed and broke; ſo that the waters are diſcharged, the uterus contracts, and, with the aſſiſtance of the muſcles, the child is forced along and delivered.

How to diſtinguiſh the falſe *Labour* from the true, and the means to be uſed on that occaſion. If the os uteri remains cloſe ſhut, it may be taken for granted that the woman is not yet in labour, notwithſtanding the pains ſhe may ſuffer: with regard to which, an accurate inquiry is to be made; and if her complaints proceed from an over-ſtretching fullneſs of the uterus or veſſels belonging to the neighbouring parts, blooding in the arm or ancle, to the quantity of ſix or eight ounces, ought to be preſcribed, and repeated occaſionally. If the pains are occaſioned by a looſeneſs or diarrhœa, it muſt be immediately reſtrained with opiates. Cholick pains are diſtinguiſhed from thoſe of labour, by being chiefly confined to the belly, without going off and returning by diſtinct intervals: they are for the moſt part produced by fæces too long retained in the colon, or by ſuch ingeſta as occaſion a rarefaction or expanſion of air in the inteſtines; by which they are violently ſtretched and vellicated. This complaint muſt be removed by opening glyſters, to empty the guts of their noxious contents: and this evacuation being performed, opiates may be adminiſtered to aſſuage the pains; either to be injected by the anus, taken by the mouth, or applied externally in form of epithem or embrocation.

Sometimes, the os internum may be a little dilated, and yet it may be difficult to judge whether or not the patient be in labour; the caſe, however, may be aſcertained, after ſome attendance, by theſe conſiderations: if the woman is not arrived at her full time; if no ſoft or glary mucus hath been diſcharged from the vagina; if the pains are limited to the region of the belly, without extending to the back and inſide of the thighs; if they are ſlight, and continue without intermiſſion or increaſe; nay, if they have long intervals, and recur without force ſufficient to puſh down the waters and membranes, or child's head, to open the os internum; if this part be felt thick and rigid, inſtead of being ſoft, thin, and yielding; we may ſafely pronounce, that labour is not yet begun; and thoſe alarms are to be removed as we have directed in the caſe of falſe or cholick pains. Beſides, if the pulſe be quick and ſtrong, and the patient attacked by ſtitches in the ſides, back, or head, blooding will be likewiſe neceſſary.

The diviſion of *Labours*. A natural labour is when the head preſents, and the woman is delivered by her pains and the aſſiſtance commonly given: but, ſhould the caſe be ſo tedious and lingering, that we are obliged to uſe extraordinary force, in ſtretching the parts, extracting with the forcepts, or (to ſave the mother's life) in opening the head and delivering with the crotchet, it is diſtinguiſhed by the appellation of laborious: and the preternatural comprehends all thoſe caſes in which the child is brought by the feet, or the body delivered before the head. Neither do we mind how the child preſents, ſo much as the way in which it is delivered: for there are caſes in which the head preſents, and for ſeveral hours we expect the child will be delivered in the natural way; but if the woman has not ſtrength enough to force down the child's head into the pelvis, or in floodings, we are at length obliged to turn and bring it by the feet, becauſe it is ſo high that the forceps cannot be applied; and if the child is not large, nor the pelvis narrow, it were pity to deſtroy the hopes of the parents, by opening the ſkull and extracting with the crotchet. In this caſe, therefore, although the child preſents in a natural way, we are obliged to turn and deliver it in the ſame manner as if the ſhoulder, breaſt, or back, had preſented; and generally, this operation is more difficult than in either of thoſe caſes, becauſe, if the waters are all diſcharged, and the uterus cloſe contracted round the fœtus, it is more difficult to raiſe the head to the fundus. When the breech preſents, we are frequently obliged to puſh it up, and ſearch for the legs; which being found, we proceed to deliver the body, and laſtly the head. If the head is large, or the pelvis narrow, and the waters not diſcharged, we ought, if poſſible, to turn the child into the natural poſition.

For a further illuſtration, and to inform young practitioners that difficult caſes do not frequently occur, ſuppoſe, of three thouſand women in one town or village, one thouſand ſhall be delivered in the ſpace of one year, and in nine hundred and ninety of theſe births, the child ſhall be born without any other than common aſſiſtance: fifty children of this number ſhall offer with the forehead turned to one ſide, at the lower part of the pelvis, where it will ſtop for ſome time; ten ſhall come with the forehead towards the groin, or middle of the pubes; five ſhall preſent with the breech, two or three with the face, and one or two with the ear; yet, all theſe ſhall be ſafely delivered, and the caſe be more or leſs lingering and laborious, according to the ſize of the pelvis and child, or ſtrength of the woman: of the remaining ten that make up the thouſand, ſix ſhall preſent with the head differently turned, and two with the breech; and theſe cannot be ſaved without ſtretching the parts, uſing the forceps or crocket, or puſhing up the child in order to bring it by the feet; this neceſſity proceeding either from the weakneſs of the woman, the rigidity of the parts, a narrow pelvis, or a large child, &c. the other two ſhould lie acroſs, and neither head nor breech, but ſome other part of the body preſent, ſo that the child muſt be turned and delivered by the feet. Next year, let us ſuppoſe another thouſand women delivered in the ſame place; not above three, ſix, or eight, ſhall want extraordinary aſſiſtance; nay, ſometimes, though ſeldom, when the child is young, or unuſually ſmall, and the mother has ſtrong pains and a large pelvis, it ſhall be delivered even in the very worſt poſition, without any other help than that of the labour-pains.

As the head, therefore, preſents right in nine hundred and twenty of a thouſand labours, all ſuch are to be accounted natural; thoſe of the other ſeventy, that require aſſiſtance, may be deemed laborious; and the other ten to be denominated laborious or preternatural, as they are delivered by the head or feet.

In order therefore to render this treatiſe as diſtinct as poſſible, for the ſake of the reader's memory, as well as of the dependance and connection of the different labours, they are divided in the following manner: that is accounted natural, in which the head preſents, and the woman is delivered without extraordinary help; thoſe births are called laborious or nonnatural, when the head comes along with difficulty, and muſt be aſſiſted either with the hand in opening the parts, or with the fillet or forceps, or even when there is a neceſſity for opening and extracting it with the crotchet; and thoſe in which the child is brought by the breech or feet, are denominated preternatural, becauſe the delivery is performed in a preternatural way.

Of the different poſitions of women in *Labour*. In almoſt all countries, the woman is allowed either to ſit, walk about, or reſt upon a bed, until the os uteri is pretty much dilated by the gravitation of the waters, or (when they are in ſmall quantity) by the head of the fœtus, ſo that delivery is ſoon expected; when ſhe is put in ſuch poſition as is judged more ſafe, eaſy, and conveni-

ent

ent for that purpose: but the patient may be put upon labour too prematurely, and bad consequences will attend such mistakes.

Among the Egyptians, Grecians, and Romans, the woman was placed upon an high stool; in Germany and Holland they use the chair which is described by Deventer and Heister; and for hot climates the stool is perfectly well adapted: but in northern countries, and cold weather, such a position must endanger the patient's health.

In the West Indies, and some parts of Britain, the woman is seated on a stool made in form of a semicircle: in other places she is placed in a woman's lap; and some, kneeling on a large cushion, are delivered backwards.

In France the position is chiefly that of half sitting and half lying, on the side or end of a bed; or the woman being in naked bed, is raised up with pillows or a bed-chair.

The London method is very convenient in natural and easy labours; the patient lies in bed upon one side, the knees being contracted to the belly, and a pillow put between them to keep them asunder. But the most commodious method is to prepare a bed and a couch in the same room; a piece of oiled cloth or dressed sheep skin is laid across the middle of each; over the under-sheet, and above this, are spread several folds of linen, pinned or tied with tape to each side of the bed and couch; these are designed to spunge up the moisture in time of labour and after delivery, while the oiled cloths or sheep skins below preserve the feather-bed from being wetted or spoiled: for this purpose, some people lay besides upon the bed several under-sheets over one another, so that by sliding out the uppermost every day, they can keep the bed dry and comfortable.

The couch must be no more than three feet wide, and provided with castors; and the woman without any other dress than that of a short or half shift, a linen skirt or petticoat open before, and a bed-gown, ought to lie down upon it, and be covered with cloaths according to the season of the year. She is commonly laid on the left side, but in that particular she is to consult her own ease; and a large sheet being doubled four times or more, one end must be slipt in below her breech, while the other hangs over the side of the couch, to be spread upon the knee of the accoucheur or midwife, who sits behind her on a low seat. As soon as she is delivered, this sheet must be removed, a soft warm cloth applied to the os externum, and the pillow taken from betwixt her knees: she then must be shifted with a clean, warm, half shift, linen skirt, and bed-gown, and her belly kept firm with the broad head-band of the skirt, the ends of which are to be pinned across each other. These measures being taken, the couch must be run close to the bed-side, and the patient gently moved from one to another; but, if there is no couch, the bed must be furnished with the same apparatus. Some, again, are laid across the foot of the bed, to the head of which the cloaths are previously turned up till after delivery, when the woman's posture is adapted, and then they are rolled down again to cover and keep her warm: by this expedient, the place of a couch is supplied, and the upper part of the bed preserved soft and clean; whereas those who are laid above the cloaths must be taken up and shifted while the bed is put to rights; in which case, they are subject to fainting; and to such as are very much enfeebled, this fatigue is often fatal.

Women are most easily touched, least fatigued, and kept warmest, when they lie on one side: but if the labour should prove tedious, the Parisian method seems most eligible; because when the patient half sits, half lies, the brim of the pelvis is horizontal, a perpendicular line falling from the middle space between the scrobiculus cordis and navel, would pass exactly through the middle of the basin. In this position, therefore, the weight of the waters, and, after the membranes are broke, that of the child's head, will gravitate downwards, and assist in opening the parts; while the contracting force of the abdominal muscles and uterus, is more free, strong, and equal in this than in any other attitude. Wherefore, in all natural cases, when the labour is lingering or tedious, this or any other position, such as standing or kneeling, ought to be tried, which by an additional force, may help to push along the head, and alter its direction when it does not advance in the right way. Nevertheless, the patient must by no means be too much fatigued.

When the woman lies on the left side, the right hand must be used in touching, and vice versa; unless she is laid across the bed; in which case, either hand will equally answer the same purpose: but, if she lies athwart, with the breech towards the bed's foot, it will be most convenient to touch with the left hand when she is upon the left side, and with the right when in the opposite position. And here it will not be amiss to observe, that in laborious and preternatural deliveries, the reader must suppose the woman lying on her back, except when another posture is prescribed; and that in natural and laborious labours, whether she be upon her side or back, the head and shoulders are a little raised into a reclining posture, so that she may breathe easily, and assist the pains.

But in preternatural labours, when there is a necessity for using great force in turning the child, the head and shoulders must lie lower than the breech, which being close to the side or foot of the bed, ought to be raised higher than either, because when the pelvis is in this situation, the hand and arm are easily pushed up in a right line, along the back part of the uterus, even to its fundus. Sometimes, however, when the feet of the child are towards the belly of the mother, they are more easily felt and managed when she lies on her side. At other times, placing the woman on her knees and elbows on a low couch, according to Deventer's method, will succeed better, by diminishing in part the strong resistance from the pressure and weight of the uterus and child, by which the feet will sometimes be easier found and delivered: but then it is safer for the child, and easier to the operator and mother, to turn her to her back before you deliver the body and head.

Of the management of women in a *Natural Labour.* In a woman come to full time, labour commonly begins and proceeds in the following manner:

The os uteri is felt soft, and a little opened; the circumference being sometimes thick, but chiefly thin: from this aperture is discharged a thick mucus, which lubricates the parts, and prepares them for stretching. This discharge usually begins some days before, and is accounted the forerunner of real labour: at the same time, the woman is seized at intervals with slight pains that gradually stretch the os uteri, fitting it for a larger dilation; and when labour actually begins, the pains become more frequent, strong, and lasting.

At every pain, the uterus is strongly compressed by the same effort which expels the contents of the rectum at stool, namely the inflation of the lungs, and the contraction of the abdominal muscles.

If the child be surrounded with a large quantity of waters, the uterus cannot come in contact with the body of it, but at every pain the membranes are pushed down by the fluid they contain, and the mouth of the womb being sufficiently opened by this gradual and repeated distension, they are forced into the middle of the vagina; then the uterus contracts and comes in contact with the body of the child, and, if it be small, the head is propelled with the waters. Here the membranes usually break; but, if that is not the case, they are pushed along towards the os externum, which they also gradually open, and appear on the outside, in the form of a large round bag. Mean while, the head advances, and the os externum being by this time fully dilated, is also protruded; when, if the membranes, instead of bursting in the middle of the protuberance, are tore all round at the os externum, the child's head is covered with some part of them, which goes under the name of the caul, or king's-hood. If the placenta is, at the same time, separated from the uterus, and the membranes remain unbroken, the secundines, waters, and child, are delivered together; but, if the placenta adheres, they must of course give way: and should they be tore all around from the placenta, the greatest part of the body as well as the head of the child will be inveloped by them, from which it must be immediately disengaged, that the air may have a free passage into the lungs.

When the head is large, so that it does not descend immediately into the pelvis, the membranes are forced down by themselves; and being stretched thinner and thinner, give way; when all the waters which are further advanced than the head, run out; then the uterus coming in contact with the body of the child, the head is squeezed

ſqueezed down into the mouth of the womb, which it plugs up ſo as to detain the reſt of the waters.

Sometimes, when the quantity of waters is very ſmall, and the uterus embraces the body of the child, the head, covered with the membranes, is forced downwards, and gradually opens the os internum; but, at its arrival in the middle of the pelvis and vagina, part of the waters will be puſhed down before it, ſometimes in a large, and ſometimes in a ſmall proportion, towards the back part of the pelvis. At other times, when the waters are in ſmall quantity, no part of them are to be diſtinguiſhed further than the head, which deſcending lower and lower, the attenuated membranes are ſplit upon it; while, at the ſame time, it fills up the mouth of the womb and upper part of the vagina, in ſuch a manner as hinders the few remaining waters from being diſcharged at once; though in every pain, a ſmall quantity diſtils on each ſide of the head, for lubricating the parts, ſo as that the child may ſlip along the more eaſily.

The uterus contracts, the pains become quicker and ſtronger, the crown of the head is puſhed down to the lower part of the pelvis, againſt one of the iſchia, at its lower extremity; the forehead, being at the upper part of the oppoſite iſchium, is forced into the hollow of the under part of the ſacrum, while the vertex and hindhead is preſſed below the os pubis, from whence it riſes in a quarter turn, gradually opening the os externum: the frænum labiorum, or fourchette, perinæum, fundament, and the parts that intervene betwixt that and the extremity of the ſacrum, are all ſtretched outwards in form of a large tumour. The perinæum, which is commonly but one inch from the os externum to the anus, is now ſtretched to three, the anus to two, and the parts between that and the coccyx are ſtretched from two inches to about three or more. The broad ſacroſciatick ligaments reaching from each ſide of the lower part of the ſacrum, to the under part of each iſchium, are alſo outwardly extended, and the coccyx is forced backward; while the crown of the head, where the lambdoidal croſſes the end of the ſagittal future, continues to be puſhed along, and dilates the os externum more and more.

When the head is ſo far advanced, that the back part of the neck is come below the under part of the os pubis, the forehead forces the coccyx, fundament, and perinæum, backwards and downwards; then the hindhead riſes about two or three inches from under the pubes, making a half round turn in its aſcent by which the forehead is equally raiſed from the parts upon which it preſſed, and the perinæum eſcapes without being ſplit or torn: at the ſame time, the ſhoulders advance into the ſides of the pelvis at its brim, where it is wideſt, and, with the body, are forced along and delivered: mean while, by the contraction of the uterus, the placenta and chorion are looſed from the inner ſurface to which they adhered, and forced through the vagina, out at the os externum.

When the head reſts at firſt above the brim of the pelvis, and is not far advanced, the fontanelle may be plainly felt with the finger, commonly towards the ſide of the pelvis: this is the place where the coronal croſſes the ſagittal future, and the bones are a little ſeparated from each other, yielding a ſoftneſs to the touch, by which may be diſtinguiſhed four futures, or rather one croſſing another. Theſe may be plainly perceived, even before the membranes are broke; yet the examination muſt not be made during a pain, when the membranes are ſtretched down and filled with waters; but only when the pain begins to remit, and the membranes to be relaxed; otherwiſe they may be broke too ſoon, before the os internum be ſufficiently dilated, and the head properly advanced.

When the vertex is come lower down, the ſagittal future only is to be felt; becauſe, as the hindhead deſcends in the pelvis, the fontanelle is turned more backwards, to the ſide, or towards the concavity of the ſacrum: but, after it has arrived below the under part of the oſſa pubis, the lambdoidal may be felt croſſing the end of the ſagittal future, the occiput making a more obtuſe angle than that of the parietal bones, at the place where the three are joined together. But all theſe circumſtances are more eaſily diſtinguiſhed after the membranes are broke, or when the head is ſo compreſſed that the bones ride over one another, provided the hairy ſcalp be not exceſſively ſwelled.

How and when to break the *Membranes*. If the child be ſurrounded with a large quantity of waters, the uterus cannot come in contact with the body ſo as to preſs down the head, until the membranes are puſhed a conſiderable way before it into the vagina; nor even then, until they are broke, and the fluid diminiſhed in ſuch a manner as will allow the womb to contract, and, with the aſſiſtance of the pains, force along the child. When the membranes therefore are ſtrong or unadvanced, and continue ſo long unbroke that the delivery is retarded, provided the os internum be ſufficiently dilated, they ought to be broke without further delay; eſpecially if the woman hath been much fatigued or exhauſted with labour, or is ſeized with a violent flooding: in which caſe, the rupture of the membranes haſtens delivery, and the hæmorrhage is diminiſhed by the contraction of the uterus, which leſſens the mouths of the veſſels that are alſo compreſſed by the body of the child.

The common method of breaking the membranes is by thruſting the finger againſt them when they are protruded with the waters during the pain, or by pinching them with the finger and thumb; but if they are detained too high to be managed in either of theſe methods, the hand may be introduced into the vagina, if the os externum is ſo lax as to admit it eaſily: and if this cannot be done without giving much pain, the fore and middle fingers being puſhed into the vagina with the other hand, let a probe or pair of pointed ſciſſars be directed along and between them, and thruſt through the membranes, when they are puſhed with the waters below the head. This operation muſt be cautiouſly performed, leſt the head ſhould be wounded in the attempt; and as for the membranes, let the opening be never ſo ſmall, the waters are diſcharged with force ſufficient to tear them aſunder.

If the vertex, inſtead of reſting at the ſide of the brim of the pelvis, or at the os pubis, is forced further down to the os internum, and the waters happen to be in ſmall quantity, the head is puſhed forwards, and gradually opens the mouth of the womb without any ſenſible interpoſion of the waters: then it advances by degrees into the vagina, and the membranes being ſplit or tore, little or nothing is diſcharged until the body of the child be delivered: and in this caſe, the hair of the head being plainly felt, will be a ſufficient indication that the membranes are broke. If no hair is to be felt, but a ſmooth body preſents itſelf to the touch; and the woman has undergone many ſtrong pains, even after the mouth of the womb hath been largely dilated, and the head forced into the middle of the pelvis; you may conclude, that delivery is retarded by the rigidity of the membranes; that there is but a ſmall quantity of waters; and that, if the containing ſacs were broke, the head would come along without further heſitation.

Sometimes, no waters can be felt while the head is no further advanced than the upper part of the pelvis, becauſe it plugs up the paſſage and keeps them from deſcending; but, as it advances downwards, the uterus contracts, and they are forced down in a ſmall quantity towards the back part: from thence, as the head deſcends, or even though it ſhould ſtick in that ſituation, they are puſhed further down, and the membranes may be eaſily broke; but the taſk is more difficult when no waters come down, and the membranes are contiguous to the head. In this caſe, they muſt be ſcratched a little during every pain, with the nail of a finger, which, though ſhort and ſmooth, will, by degrees, wear them thinner and thinner, until they ſplit upon the head by the force of labour. Yet this expedient ought never to be uſed until you are certain that delivery is retarded by their rigidity; for, if that be not the hinderance, the difficulty muſt proceed from the weakneſs of the woman, a large head, or narrow pelvis: in which caſe, the delivery is a work of time, and will be obſtructed by the premature diſcharge of the waters, which by gradually paſſing by the head, ought to keep the parts moiſt and ſlippery, in order to facilitate the birth: for when the membranes are not broke until the head is forced into the middle of the pelvis, the largeſt part of it being then paſt the upper part of the ſacrum, is commonly ſqueezed along, opens the os externum, and is delivered before all the waters are diſcharged from the uterus; ſo that what remains, by moiſtening and lubricating the parts, help the ſhoulders and body to paſs with more eaſe. When the membranes are too ſoon broke, the

the under part of the uterus contracts sometimes so strongly before the shoulders, that it makes the resistance still greater.

In most natural labours, the space betwixt the fore and back fontanelles, viz. the vertex, presents to the os internum, and the forehead is turned to the side of the pelvis; because the basin at the brim is widest from side to side; and frequently, before the head is pushed in and fast wedged among the bones, the child (after a pain) is felt to move and turn it to that side or situation in which it is least pressed and hurt, if it was not presenting in that position before: but this position of the head may alter, viz. in those where it is as wide, or wider, from the back part to the fore part of the brim, than from side to side, the forehead may be turned backwards or forwards. But this form of the pelvis seldom happens.

This posture is always observed in a narrow pelvis, when the upper part of the sacrum jets forward to the pubes; but, as the child is forced lower down, the forehead turns into the hollow at the inferior part of the sacrum, because the vertex and occiput find less resistance at the lower part of the ossa pubis than at the ischium, to which it was before turned; the pelvis being at the pubes, as formerly described, no more than two inches in depth, whereas at the ischium it amounts to four. If, therefore, the forehead sticks in its former situation, without turning into the hollow, it may be assisted by introducing some fingers, or the whole hand, into the vagina, during a pain, and moving it in the right position.

When the head of the fœtus presents, and is forced along in any of those positions, the labour is accounted natural; and little else is to be done, but to encourage the woman to bear down with all her strength in every pain, and to rest quietly during each interval: if the parts are rigid, dry, or inflamed, they ought to be lubricated with pomatum, hog's lard, butter, or ung. altheæ: the two first are most proper for the external parts; and the two last (as being harder and not so easily melted) ought to be put up into the vagina, to lubricate that and the os internum.

The mouth of the womb and os externum, for the most part, open with greater difficulty in the first than in the succeeding labours, more especially in women turned of thirty. In these cases, the os externum must be gradually dilated in every pain, by introducing the fingers in form of a cone, and turning them round, so as to stretch the parts by gentle degrees; and the whole hand being admitted into the vagina, it will be sometimes found necessary to insinuate the fingers, with the flat of the hand between the head and os internum: for, when this precaution is not taken in time, the os uteri is frequently pushed before the head (especially that part of it next the pubes) even through the os externum; or if the head passes the mouth of the womb, it will protrude the parts at the os externum, and will endanger a laceration in the perinæum. This dilatation, however, ought to be cautiously performed, and never attempted except when it is absolutely necessary; even then it must be effected slowly, and in time of a pain, when the woman is least sensible of the dilating force.

When the labour happens to be lingering, though every thing be in a right posture, if the assistants are clamorous, and the woman herself too anxious and impatient to wait the requisite time without complaining, the labour will be actually retarded by her uneasiness, which we must endeavour to surmount by arguments and gentle persuasion; but if she is not to be satisfied, and strongly impressed with an opinion that certain medicines might be administered to hasten delivery, it will be convenient to prescribe some innocent medicine, that she may take between whiles, to beguile the time and please her imagination: but, if she is actually weak and exhausted, it will be necessary to order something that will quicken the circulating fluids, such as preparations of amber, castor, myrrh, volatile spirits, the pulv. myrrh. composit. of the London, or pulv. ad partum of the Edinburgh Pharmacopœia, with every thing in point of diet and drink that nourishes and strengthens the body. If the patient is of a plethorick habit, with a quick strong pulse, the contrary method is to be used, such as venesection, antiphlogistick medicines, and plentiful draughts of weak diluting fluids.

How to behave when the birth is obstructed by the *Navel-string* or *Shoulders* of the *Child*, or a *narrow Pelvis*. Although the head is pushed down into the pelvis, and the vertex employed in opening the os externum, the forehead being lodged in the concavity formed by the coccyx and lower part of the sacrum; yet frequently after the labour-pain is abated, the head again is withdrawn by the navel-string happening to be twisted round the neck; or when the shoulders, instead of advancing, are retarded at the brim of the pelvis, one resting over the ossa pubis, while the other is fixed at the sacrum; or when (the waters having been long evacuated) the under-part of the uterus contracts round the neck and before the shoulders, keeping up the body of the child.

When the head is therefore drawn back by any of these obstacles, and the delivery hath been retarded during several pains, one or two fingers being introduced into the rectum before the pain goes off, ought to press upon the forehead of the child at the root of the nose, great care being taken to avoid the eyes: this pressure detains the head till the return of another pain, which will squeeze it further down, while the fingers pushing slowly and gradually, turn the forehead half round outwards and half round upwards. By this assistance, and the help of strong pains, the child will be forced along, although the neck be entangled in the navel-string; for, as the child advances, the uterus contracts, and consequently the placenta is moved lower: the funis umbilicalis will also stretch a little, without obstructing the circulation.

The head being thus kept down, the shoulders too are pressed in every succeeding pain until they are forced into the pelvis, when the whole comes along without further difficulty. And this expedient will, moreover, answer the purpose, when the under part of the uterus or os internum is contracted round the neck of the child, and before the shoulders; also, when the head is very low, pressing a finger on each side of the coccyx externally will frequently assist in the same manner; also in lingering cases, when the woman is weak, the head large, or the pelvis narrow, you may assist the delivery by gently stretching both the os externum and internum with your fingers, in time of the pains, which will increase the same, as well as dilate; but this is only to be done when absolutely necessary, and with caution, and at intervals, for fear of inflaming or lacerating the parts.

Over and above these obstacles, the head may be actually delivered and the body retained by the contraction of the os externum round the neck, even after the face appears externally. In this case it was generally alledged that the neck was close embraced by the os internum; but this seldom happens when the head is delivered, because then the os internum is kept dilated on the back part and sides by the breast and arms of the fœtus, unless it be forced low down with or before the head.

When the head is delivered and the rest of the body retained from the largeness or wrong presenting of the shoulders, or by the navel-string's being twisted round the body or neck of the child, the head must be grasped on each side, the thumbs being applied to the occiput, the fore and middle fingers extended along each side of the neck, while the third and fourth of each hand support each side of the upper jaw: thus embraced, the head must be pulled straight forwards; and if it will not move easily along, the force must be increased, and the directions varied from side to side, or rather from shoulder to shoulder, not by sudden jerks, but with a slow, firm, and equal motion. If the body cannot be moved in this manner, though you have exerted as much force as possible without running the risk of over-straining the neck, you must endeavour to slip the turns of the navel-string over the head: but should this be found impracticable, you ought not to trifle in tying the string at two places, and cutting betwixt the ligatures, as some people have advised: such an operation would engross too much time; besides, the child is in no danger of suffocating from the stricture of the funis, because it seldom or never breathes before the breast is delivered.

The better method is, immediately to slide along one or two fingers, either above or below, to one of the armpits; by which you try to bring along the body, while, with the other hand, you pull the neck at the same time:

if it ftill continues unmoved, fhift hands, and let the other arm-pit fuftain the force; but, if this fail, cut the navel-ftring, and tie it afterwards. If the fhoulders lie fo high that the fingers cannot reach far enough to cut or take fufficient hold, let the flat of the hand be run along the back of the child: or fhould the os externum be ftrongly contracted round the neck, pufh up your hand along the breaft, and pull as before; and fhould this method fail, you muft have recourfe to the blunt hook introduced and fixed in the arm pit; but this expedient muft be ufed with caution, left the child fhould be injured, or the parts lacerated.

The child being born, the funis umbilicalis muft be divided, and the placenta delivered, according to the directions that will occur in the fequel.

How to manage the *Child* after *Delivery*. The child being delivered, ought to be kept warm beneath the bedcloaths, or immediately covered with a warmed flannel or linen cloth: if it cries and breathes, the umbilical cord may be tied and cut, and the child delivered to the nurfe without delay; but, if the air does not immediately rufh into the lungs, and the circulation continues between it and the placenta, the operation of tying and cutting muft be delayed, and every thing tried to ftimulate, and fometimes to give pain. If the circulation is languid, refpiration begins with difficulty, and proceeds with long intervals; and if it be entirely ftopped in the funis, the child, if alive, is not eafily recovered; fometimes a great many minutes are elapfed before it begins to breathe. Whatever augments the circulating force, promotes refpiration; and as this increafes, the circulation grows ftronger, fo that they mutually affift each other. In order to promote the one and the other, the child is kept warm, moved, fhaken, whipt; the head, temples, and breaft rubbed with fpirits, garlick, onion, or muftard applied to the mouth and nofe; and the child has been fometimes recovered by blowing into the mouth with a filver canula, fo as to expand the lungs.

When the placenta is itfelf delivered, immediately or foon after the child, by the continuance of the labour-pains, or hath been extracted by the operator, that the uterus may contract, fo as to reftrain too great a flooding; in this cafe, if the child has not yet breathed, and a pulfation is felt in the veffels, fome people (with good reafon) order the placenta, and as much as poffible of the navel-ftring, to be thrown into a bafon of warm wine or water, in order to promote the circulation between them and the child; others advife us to lay the placenta on the child's belly, covered with a warm cloth; and a third fet order it to be thrown upon hot afhes: but, of thefe, the warm water feems the moft innocent and effectual expedient. Neverthelefs, if the placenta is ftill retained in the uterus, and no dangerous flooding enfues, it cannot be in a place of more equal warmth, while the operator endeavours, by the methods above defcribed, to bring the child to life.

In lingering labours, when the head of the child hath been long lodged in the pelvis, fo that the bones ride over one another, and the fhape is preternaturally lengthened, the brain is frequently fo much compreffed, that violent convulfions enfue before or foon after the delivery, to the danger and oft-times the deftruction of the child. This diforder is frequently relieved and carried off, and the bad confequences of the long compreffion prevented, by cutting the navel-ftring before the ligature is made, or tying it fo flightly as to allow two, three, or four large fpoonfuls to be difcharged.

If the child has been dead one or two days before delivery, the lips and genitals (efpecially the fcrotum in boys) are of a livid hue; if it hath lain dead in the uterus two or three days longer, the fkin may be eafily ftript from every part of the body, and the navel-ftring appears of the fame colour with the lips and genitals: in ten or fourteen days, the body is much more livid and mortified, and the hairy fcalp may be feparated with eafe; and indeed, any part of the child which hath been ftrongly preffed into the pelvis, and retained in that fituation for any length of time, will adopt the fame mortified appearance.

How to tie the *funis umbilicalis*. Different practitioners have ufed different methods of performing this operation: fome propofing to tie and feparate the funis before the placenta is delivered; to apply one ligature clofe to the belly of the child, with a view to prevent a rupture of the navel; and making another two inches above the former, to divide the rope between the two tyings: by the fecond ligature, they mean to prevent a dangerous hæmorrhage from the woman, provided the placenta adheres to the uterus. But all thefe precautions are founded upon miftaken notions, and the following feems to be that which is eafieft and beft: if the placenta is not immediately delivered by the pains, and no flooding obliges you to haften the extraction, the woman may be allowed to reft a little, and the child to recover, if it does not breathe, or the refpiration is weak, let the methods above prefcribed be put in practice, with a view to ftimulate the circulation; but if the child is lively, and cries with vigour, the funis may be immediately tied in this manner: having provided a ligature or two, compofed of fundry threads waxed together, fo as to equal the diameter of a pack-thread, being feven inches in length, and knotted at each end, tie the navel-ftring about two fingers breadth from the belly of the child, by making at firft one turn, if the funis be fmall, and fecuring it with two knots; but if the cord be thick, make two more turns, and another double knot; then cut the funis with a pair of fharp fciffars one finger's breadth from the ligature towards the placenta; and in cutting run the fciffars as near as poffible to the root of the blades, elfe the funis will be apt to flip from the edge, and you will be obliged to make feveral fnips before you can effect a feparation: at the fame time, guard the points of the fciffars with your other hand. The child being wafhed, a linen rag is wrapped round the tied funis; which being doubled up along the belly, a fquare comprefs is laid over it, and kept firm or moderately tight with what the nurfes call a belly-band, or roller round the body.

This portion of the funis foon fhrinks, turns firft livid, then black, and about the fifth day falls off clofe to the belly; and let the navel-ftring be tied in any part, or at any diftance whatfoever from the belly, it will always drop off at the fame place: fo that ruptures in the navel feldom or never depend upon the tying of the funis, but may happen when the comprefs and belly band are not kept fufficiently firm, and continued fome time after the feparation of the withered portion, efpecially in thofe children that cry much: the bandage ought always to be applied fo flight as not to affect refpiration.

The ligature upon the funis muft always be drawn fo tight as to fhut up the mouths of the veffels: therefore, if they continue to pour out their contents, another ligature muft be applied below the former; for if this precaution be neglected, the child will foon bleed to death: yet, if the navel-ftring is cut or tore afunder at two or three hand-breadths from the belly, and expofed to the cold without any ligature, the arteries will contract themfelves, fo as that little or no blood fhall be loft; nay, fometimes, if the funis hath been tied and cut at the diftance of three finger-breadths from the child's belly, fo as that it hath been kept from blooding for an hour or two, although the ligature be then untied, and the navel-ftring and belly chafed, and foaked in warm water, no more blood will be difcharged.

Of delivering the *Placenta*. The funis being feparated, and the child committed to the nurfe, the next care is to deliver the placenta and membranes, if they are not already forced down by the labour-pains. We have already obferved, that if there is no danger from a flooding, the woman may be allowed to reft a little, in order to recover from the fatigue fhe has undergone; and that the uterus may, in contracting, have time to fqueeze and feparate the placenta from its inner furface: during which paufe alfo, about one, two or three tea-cups full of blood is difcharged through the funis, from the veffels of the placenta, which is thus diminifhed in bulk, fo that the womb may be the more contracted; and this is the reafon for applying one ligature only upon the cord. In order to deliver the placenta, take hold of the navel-ftring with the left hand, turning it round the fore and middle fingers, or wrapping it in a cloth, that it may not flip from your grafp; then pull gently from fide to fide, and defire the woman to affift your endeavour, by ftraining as if fhe were at ftool, blowing forcibly into her hand, or provoking herfelf to reach by thrufting her finger into her throat. If by thefe methods the placenta

cannot be brought away, introduce your hand ſlowly into the vagina, and feel for the edge of the cake; which when you have found, pull it gradually along; as it comes out at the os externum, take hold of it with both hands and deliver it, bringing away, at the ſame time, all the membranes, which, if they adhere, muſt be pulled along with leiſure and caution.

When the funis takes its origin towards the edge of the placenta, which is frequently the caſe, the cake comes eaſier off by pulling, than when the navel-ſtring is inſerted in the middle, unleſs it be uncommonly retained by its adheſion to the womb, or by the ſtrong contraction of the os internum. If the funis is attached to the middle of the placenta, and that part preſents to the os internum or externum, the whole maſs will be too bulky to come along in that poſition: in this caſe you muſt introduce two fingers within the os externum, and bring it down with its edge foremoſt.

When the placenta is ſeparated by the contraction of the uterus, in conſequence of its weight and bulk, it is puſhed down before the membranes, and both are brought away inverted.

When part of the placenta hath paſſed the os internum, and the reſt of it cannot be brought along by eaſy pulling, becauſe the os uteri is cloſe contracted round the middle of it, or part of it ſtill adheres to the womb, ſlide the flat of your hand below the placenta through the os internum; and having dilated the uterus, ſlip down your hand to the edge of the cake, and bring it along: but, if it adheres to the uterus, puſh up your hand again, and having ſeparated it cautiouſly, deliver it as before.

If, inſtead of finding the edge or middle of the placenta preſenting to the os externum or internum, you feel the mouth of the womb cloſely contracted, you muſt take hold of the navel-ſtring as above directed, and ſlide your other hand along the funis into the vagina; then ſlowly puſh your fingers and thumb, joined in form of a cone, through the os uteri, along the ſame cord, to the place of its inſertion in the placenta: here let your hand reſt, and feel with your fingers to what part of the uterus the cake adheres: if it be looſe at the lower edge, try to bring it along; but if it adheres, begin and ſeparate it ſlowly, the back of your hand being turned to the uterus, and the fore-part of your fingers towards the placenta: and for this operation the nails ought to be cut ſhort and ſmooth. In ſeparating, preſs the ends of your fingers more againſt the placenta than the uterus; and if you cannot diſtinguiſh which is which, becauſe both feel ſoft (though the uterus is firmer than the placenta, and this laſt more ſolid than coagulated blood;) in this caſe, ſlide down your fingers to its edge, and conduct them by the ſeparated part, preſſing it gently from the uterus, until the whole is diſengaged. Sometimes, when part of it is ſeparated, the reſt will looſen and come along, if you pull gently at the detached portion; but, if this is not effected with eaſe, let the whole of it be ſeparated in the moſt cautious manner: ſometimes, alſo, by graſping the inſide of the placenta with your hand, the whole will be looſened without further trouble. As the placenta comes along, ſlide down your hand and take hold of the lower edge, by which it muſt be extracted, becauſe it is too bulky to be brought away altogether in a heap; and let it be delivered as whole as poſſible, keeping your thumb or fingers fixed upon the navel-ſtring, by which means laceration is often prevented.

When the woman lies on her back, and the placenta adheres to the left ſide of the uterus, it will be moſt commodious to ſeparate the cake with the right hand; whereas the left hand is moſt conveniently uſed when the placenta adheres to the right ſide of the womb; but when it is attached to the forepart, back, or fundus, either hand will anſwer the purpoſe.

That part of the uterus to which the placenta adheres, is kept ſtill diſtended, while all the reſt of it is contracted.

The nearer the adheſion is to the os internum, the eaſier is the placenta ſeparated, and vice verſa; becauſe it is difficult to reach up to the fundus, on account of the contraction of the os internum, and lower part of the womb, which are not ſtretched again without great force after they have been contracted for any length of time.

When therefore the placenta adheres to the fundus, and all the lower part of the womb is ſtrongly contracted, the hand muſt be forced up in form of a cone into the vagina, and then gradually dilate the os internum and inferior part of the uterus. If great force is required, exert it ſlowly, reſting between whiles, that the hand may not be cramped, nor the vagina in danger of being tore from the womb; for in this caſe, the vagina will lengthen conſiderably upwards.

While you are thus employed, let an aſſiſtant preſs with both hands on the woman's belly; or while you puſh with one hand, preſs with the other, in order to keep down the uterus, elſe it will riſe high up, and roll about like a large ball, below the lax parietes of the abdomen, ſo as to hinder you from effecting the neceſſary dilatation.

When you have overcome this contraction, and introduced your hand into the fundus, ſeparate and bring the placenta along, as above directed; and ſhould the uterus be contracted in the middle like an hour-glaſs, a circumſtance that ſometimes, though rarely happens, the ſame method muſt be practiſed.

In every caſe, and eſpecially when the placenta hath been delivered with difficulty, introduce your hand after its extraction, in order to examine if any part of the uterus be pulled down and inverted; and if that be the caſe, puſh it up and reduce it without loſs of time, then clear it of the coagulated blood, which otherwiſe may occaſion violent after-pains.

For the moſt part, in ten, fifteen, or twenty minutes, more or leſs, the placenta will come away of itſelf; and though ſome portion of it, or of the membranes, be left in the uterus, provided no great flooding enſues, it is commonly diſcharged in a day or two, without any detriment to the woman: but at any rate, if poſſible, all the ſecundines ought to be extracted at once, and before you leave your patient, in order to avoid reflections.

Thoſe labours called *laborious* and *preternatural*, we would recommend to thoſe, who mean to make it their ſtudy, a careful peruſal of Dr. Smellie's book on midwifry, and a late publication by Mr. Hamilton, ſurgeon, in Edinburgh.

The ſigns of a *dead Child*. When the head preſents, and cannot be delivered by the labour-pains; when all the common methods have been uſed without ſucceſs, the woman being exhauſted, and all her efforts vain; and when the child cannot be delivered without ſuch force as will endanger the life of the mother, becauſe the head is too large or the pelvis too narrow; it then becomes abſolutely neceſſary to open the head, and extract with the hand, forceps, or crotchet. Indeed this laſt method formerly was the common practice when the child could not be eaſily turned, and is ſtill in uſe with thoſe who do not know how to ſave the child by delivering with the forceps: for this reaſon, their chief care and ſtudy was to diſtinguiſh whether the fœtus was dead or alive; and as the ſigns were uncertain, the operation was often delayed until the woman was in the moſt imminent danger; or when it was performed ſooner, the operator was frequently accuſed of raſhneſs, on the ſuppoſition that the child might in time have been delivered alive by the labour-pains: perhaps he was ſometimes conſcious to himſelf of the juſtice of this imputation, although what he had done was an upright intention.

The ſigns of a dead fœtus were, firſt, the child's ceaſing to move and ſtir in the uterus. Secondly, The evacuation of meconium, though the breech is not preſſed into the pelvis. Thirdly, No perceivable pulſation at the fontanelle and temporal arteries. Fourthly, A large ſwelling or tumour of the hairy ſcalp. Fifthly, An uncommon laxity of the bones of the cranium. Sixthly, The diſcharge of a fœtid ichor from the vagina, the effluvia of which ſurround the woman and gave riſe to the opinion that her breath conveyed a mortified ſmell. Seventhly, Want of motion in the tongue, when the face preſents. Eighthly, No perceivable pulſation in the arteries of the funis umbilicalis, when it falls down below the head; nor at the wriſt when the arm preſents; and no motion of the fingers. Ninthly, The pale and livid countenance of the woman. Tenthly, A collapſing and flaccidity of the breaſt. Eleventhly, A coldneſs felt in the abdomen, and weight, from the child's falling like a heavy ball to the ſide on which ſhe lies. Twelfthly, A ſeparation of the hairy ſcalp on the ſlighteſt touch, and a diſtinct perception of the bare bones.

All or moſt of theſe ſigns are dubious and uncertain, except the laſt, which can only be obſerved after the fœtus hath been dead ſeveral days. One may alſo certainly pronounce the child's death, if no pulſation hath been felt in the navel ſtring for the ſpace of twenty or thirty minutes; but the ſame certainty is not to be acquired from the arm, unleſs the ſkin can be ſtripped off with eaſe.

When the *Crotchet* is to be uſed. Midwifry is now ſo much improved, that the neceſſity of deſtroying the child does not occur ſo often as formerly: indeed it never ſhould be done, except when it is impoſſible to turn, or to deliver with the forceps; and this is ſeldom the caſe but when the pelvis is too narrow, or the head too large to paſs, and therefore reſts above the brim: for this reaſon, it is not ſo neceſſary for the operator to puzzle himſelf about dubious ſigns; becauſe in theſe two caſes, there is no room for heſitation: for if the woman cannot poſſibly be delivered in any other way, and is in imminent danger of her life, the beſt practice is undoubtedly to have recourſe to that method which alone can be uſed for her preſervation, namely, to diminiſh the bulk of the head.

In this caſe, inſtead of deſtroying, you are really ſaving a life; for, if the operation be delayed, both mother and child are loſt.

The method of uſing the *Sciſſars*, *Blunt-Hook*, and *Crotchet*. When the head preſents, and ſuch is the caſe that the child can neither be delivered by turning, nor extracted with the forceps, and it is abſolutely neceſſary to deliver the woman to ſave her life, this operation muſt then be performed in the following manner:

The operator muſt be provided with a pair of curved crotchets, made according to the improvements upon thoſe propoſed by Meſnard, together with a pair of ſciſſars about nine inches long, with reſts near the middle of the blades, and the blunt hook.

Of the *Woman's Poſture*. The patient ought to be laid on her back or ſide in the ſame poſition directed in the uſe of the forceps; the operator muſt be ſeated on a low chair, and the inſtruments concealed and diſpoſed in the ſame manner, and for the ſame reaſon mentioned in treating of the forceps. The parts of the woman have already, in all likelihood, been ſufficiently dilated by his endeavours to turn or deliver with the forceps; or if no efforts of that kind have been uſed, becauſe by the touch he had learned that no ſuch endeavours would ſucceed, as in the caſe of a large hydrocephalus, when the bones of the cranium are often ſeparated at a great diſtance from each other; or upon perceiving that the pelvis was extremely narrow: if, upon theſe conſiderations, he hath made no trials in which the parts were opened, let him gradually dilate the os externum and internum, as formerly directed.

The head is commonly kept down pretty firm, by the ſtrong contraction of the uterus round the child; but ſhould it yield to one ſide, let it be kept ſteady by the hand of an aſſiſtant, preſſing upon the belly of the woman; let him introduce his hand, and preſs two fingers againſt one of the ſutures of the cranium; then take out his ſciſſars from the place in which they were depoſited, and guiding them by the hand and fingers till they reach the hairy ſcalp, puſh them gradually into it, until their progreſs is ſtopped by the reſts.

If the head ſlips aſide, in ſuch a manner, as that they cannot be puſhed into the ſkull at the ſuture, they will make their way through the ſolid bones, if they are moved in a ſemicircular turn, like the motion of boring, and this method continued till you find the point firmly fixed; for, if this is not obſerved, the points ſlide along the bones.

The ſciſſars ought to be ſo ſharp at the points, as to penetrate the integuments and bones when puſhed with a moderate force; but not ſo keen as to cut the operator's fingers, or the vagina in introducing them.

The ſciſſars being thus forced into the brain, as far as the reſts at the middle of the blades, let them be kept firm in that ſituation; and the hand that was in the vagina being withdrawn, the operator muſt take hold of the handles with each hand, and pull them aſunder, that the blades may dilate and make a large opening in the ſkull; then they muſt be ſhut, turned, and again pulled aſunder, ſo as to make the inciſion crucial; by which means the opening will be enlarged, and ſufficient room made for the introduction of the fingers: let them be afterwards cloſed, and introduced even beyond the reſts, when they muſt again be opened, and turned half round from ſide to ſide, until the ſtructure of the brain is ſo effectually deſtroyed, that it can be evacuated with eaſe. This operation being performed, let the ſciſſars be ſhut and withdrawn; but, if this inſtrument will not anſwer the laſt purpoſe, the buſineſs may be done by introducing the crotchet within the opening of the ſkull. The brain being thus deſtroyed, and the inſtrument withdrawn, let him introduce his right hand into the vagina, and two fingers into the opening which hath been made, that if any ſharp ſplinters of the bones remain, they may be broken off and taken out; leſt they ſhould injure the woman's vagina, or the operator's own fingers.

If the caſe be an hydrocephalus, let him fix his fingers on the inſide and his thumb on the outſide of the opening, and endeavour to pull along the ſkull in time of a pain; but, if labour is weak, he muſt deſire the woman to aſſiſt his endeavours by forcing down; and thus the child is frequently delivered; becauſe, the water being evacuated, the head collapſes of courſe.

But when the pelvis is narrow, the head requires much greater force to be brought along; unleſs the labour-pains are ſtrong enough to preſs it down and diminiſh it, by ſqueezing out the cerebrum: in this caſe, let the operator withdraw his fingers from the opening, and, ſliding them along the head, paſs the os uteri; then, with his left hand, taking one of the crotchets from the place of its concealment, introduce it along his right hand, with the point towards the child's head, and fix it above the chin in the mouth, back part of the neck, or above the ears, or in any place where it will take firm hold: having fixed the inſtrument, let him withdraw his right hand, and with it take hold on the end or handle of the crotchet; then introduce his left to ſeize the bones at the opening of the ſkull (as above directed) that the head may be kept ſteady, and pull along with both hands.

If the head is ſtill detained by the uncommon narrowneſs of the pelvis, let him introduce his left hand along the oppoſite ſide, in order to guide the other crotchet; which being alſo applied and locked or joined with its fellow, in the manner of the forceps, he muſt pull with ſufficient force, moving from ſide to ſide, and as it advances, turn the fore head into the hollow of the ſacrum, and extract as with the forceps, humouring the ſhape of the head and pelvis during the operation, which ought to be performed ſlowly, with great judgment and caution; and from hence it appears abſolutely neceſſary to know how the head preſents, in order to judge how the crotchet muſt be fixed, and the head brought along to the beſt advantage.

If, when the head is delivered in this manner, the body cannot be extracted, on account of its being much ſwelled, of a monſtrous ſize, or (which is moſt commonly the caſe) the narrowneſs of the pelvis; let him deſiſt from pulling, leſt the head ſhould be ſeparated from the body, and introducing one hand ſo as to reach with his fingers to the ſhoulder-blades or breaſt, conduct along it one of the crotchets, with the point towards the fœtus, and fix it with a firm application; then withdrawing his hand, employ it in pulling the crotchet, while the other is exerted in the ſame manner upon the head and neck of the child: if the inſtrument begins to loſe its hold, he muſt puſh it further up, and fixing it again, repeat his efforts, applying it ſtill higher and higher, until the body is extracted.

Of the *Management* of *Women* from the time of the delivery to the end of the month, with the ſeveral diſeaſes to which they are ſubject during that period.

Of the *external Application*. The woman being delivered of the child and placenta, let a ſoft linen cloth, warmed, be applied to the external parts; and if ſhe complains much of a ſmarting ſoreneſs, ſome pomatum may be ſpread upon it. The linen that was laid below her, to ſpunge up the diſcharges, muſt be removed, and replaced with others that are clean, dry, and warm. Let her lie on her back, with her legs extended cloſe to each other; or upon her ſide, if ſhe thinks ſhe can lie eaſier in that poſition, until ſhe recovers from the fatigue: if ſhe is ſpent and exhauſted, let her take a little warm wine or caudle, or, according to the common cuſtom, ſome nutmeg and ſugar grated together in a ſpoon: the principal

cipal design of administering this powder, which among the good women is seldom neglected, is to supply the want of some cordial draught, when the patient is too weak to be raised, or supposed to be in danger of reachings from her stomach's being overloaded. When she hath in some measure recovered her strength and spirits, let the cloths be removed from the parts, and others applied in their room; and, if there is a large discharge from the uterus, let the wet linen below her be also shifted, that she may not run the risque of catching cold.

When the patient is either weak or faintish, she ought not to be taken out of bed, or even raised up to have her head and body shifted, until she is a little recruited; otherwise she will be in danger of repeated faintings, attended with convulsions, which sometimes end in death. To prevent these bad consequences, her skirt and petticoats ought to be loosened and pulled down over the legs, and replaced by another well warmed, with a broad head-band to be slipt in below, and brought up over her thighs and hips: a warm double cloth must be laid on the belly, which is to be surrounded by the head-band of the skirt pinned moderately tight over the cloth, in order to compress the viscera and the relaxed parietes of the abdomen, more or less, as the woman can easily bear it; by which means the uterus is kept firm in the lower parts of the abdomen, and prevented from rolling from side to side when the patient is turned: but the principal end of this compression, is to hinder too great a quantity of blood from rushing into the relaxed vessels of the abdominal contents; especially when the uterus is emptied all of a sudden, by a quick delivery. The pressure being thus suddenly removed, the head is all at once robbed of its proportion of blood, and the immediate revulsion precipitates the patient into dangerous lypothymia.

For this reason the belly ought to be firmly compressed by the hands of an assistant, until the bandage is applied; or, in lieu of it, a long towel, sheet, or roller, to make a suitable compression: but, for this purpose, different methods are used in different countries, or according to the different circumstances of the patients. The head-cloaths and shift ought also to be changed, because with sweating in time of labour they are rendered wet and disagreeable. Several other applications are necessary, when the external or internal parts are rent or inflamed, misfortunes that sometimes happen in laborious and preternatural cases.

Of *Air*, *Diet*, *Sleeping* and *Watching*, *Motion* and *Rest*, *Retention* and *Excretion*, and the *Passions* of the *Mind*. Although we cannot remove the patient immediately after delivery into another climate, we can qualify the air, so as to keep it in a moderate and salutary temper, by rendering it warm or cold, moist or dry, according to the circumstances of the occasion. With regard to diet, women in time of labour, and even till the ninth day after delivery, ought to eat little solid food, and none at all during the first five or seven: let them drink plentifully of warm diluting fluids, such as barley-water, gruel, chicken-water, and teas; caudles are also commonly used, composed of water-gruel boiled up with mace and cinnamon, to which, when strained, is added a third or fourth part of white wine, or less, if the patient drinks plentifully, sweetened with sugar to their taste: this composition is termed white caudle; whereas, if ale is used instead of wine, it goes under the name of brown caudle. In some countries, eggs are added to both kinds; but, in that case, the woman is not permitted to eat meat or broths till after the fifth or seventh day: in this country, however, as eggs are no part of the ingredients, the patient is indulged with weak broth sooner, and sometimes allowed to eat a little boiled chicken. But all these different preparations are to be prescribed weaker or stronger, with regard to the spices, wine, or ale, according to the different constitutions and situations of different patients: for example, if she is low and weak, in consequence of an extraordinary discharge of any kind, either before or after delivery, or if the weather is cold, the caudles and broths may be made the stronger; but if she is of a full habit of body, and has the least tendency to a fever, or if the season is excessively hot, these drinks ought to be of a very weak consistence, or the patient restricted to gruel, tea, barley and chicken water, and these varied according to the emergency of the case.

Her food must be light and easy of digestion, such as panada, biscuit, and sago; about the fifth or seventh day she may eat a little boiled chicken, or the lightest kind of young meat: but, these last may be given sooner or later, according to the circumstances of the case, and the appetite of the patient. In the regimen as to eating and drinking, we should rather err on the abstemious side, than indulge the woman with meat and strong fermented liquors, even if these last should be most agreeable to her palate: for we find by experience, that they are apt to increase or bring on fevers, and that the most nourishing and salutary diet is that which we have above prescribed. Every thing that is difficult of digestion, or quickens the circulating fluids, must of necessity promote a fever; by which, the necessary discharges are obstructed, and the patient's life endangered.

As to the article of sleeping and watching, the patient must be kept as free from noise as possible, by covering the floors and stairs with carpets and cloths, oiling the hinges of the doors, silencing the bells, tying up the knockers, and in noisy streets strowing the pavement with straw; if, notwithstanding these precautions, she is disturbed, her ears must be stuffed with cotton, and opiates administered to procure sleep; because watching makes her restless, prevents perspiration, and promotes a fever.

Motion and rest are another part of the nonnaturals to which we ought to pay a particular regard. By tossing about, getting out of bed, or sitting up too long, the perspiration is discouraged and interrupted; and in this last attitude the uterus, yet not fully contracted, hangs down, stretching the ligaments, occasioning pain, cold shiverings, and a fever: for the prevention of these bad symptoms, the patient must be kept quiet in bed till after the fourth or fifth day, and then be gently lifted up in the bed-cloaths, in a lying posture, until the bed can be adjusted, into which she must be immediately re-conveyed, there to continue for the most part, till the ninth day, after which period women are not so subject to fevers, as immediately after delivery. Some there are, who, from the nature of their constitutions, or other accidents, recover more slowly; and such are to be treated with the same caution after, as before, the ninth day, as the case seems to indicate: others get up, walk about, and recover, in a much shorter time; but these may some time or other pay dearly for their foolhardiness, by encouraging dangerous fevers: so that we ought rather to err on the safe side, than run any risque whatsoever.

What next comes under consideration, is the circumstance of retention and excretion. We have formerly observed, that in time of labour, before the head of the child is locked into the pelvis, if the woman has not had easy passage in her belly that same day, the rectum and colon ought to be emptied by a glyster, which will assist the labour, prevent the disagreeable excretion of the fœces before the child's head, and enable the patient to remain two or three days after, without the necessity of going to stool. However, should this precaution be neglected, and the patient very costive after delivery, we must beware of throwing up stimulating glysters, or administering strong cathartics, lest they should bring on too many loose stools, which, if they cannot be stopt, sometimes produce fatal consequences, by obstructing the perspiration and lochia, and exhausting the woman, so as that she will die all of a sudden; a catastrophe which hath frequently happened from this practice. Wherefore, if it be necessary to empty the intestines, we ought to prescribe nothing but emollient glysters, or some very gentle opener, such as manna, or elect. lenitivum. But no excretion is of more consequence to the patient's recovery, than a free perspiration; which is so absolutely necessary, that unless she has a moisture continually on the surface of her body, for some days after the birth, she seldom recovers to advantage: her health, therefore, in a great measure depends upon her enjoying undisturbed repose, and a constant breathing sweat, which prevents a fever, by carrying off the tension, and assists the equal discharge of the lochia: and when these are obstructed, and a fever ensues with pain and restlessness, nothing relieves the patient so effectually as rest and profuse sweating, procured by opiates and sudorificks at the beginning of the complaints; yet these last must be more

more cautiously prescribed in excessive hot than in cool weather.

The last of the nonnaturals to be considered are the passions of the mind, which also require particular attention. The patient's imagination must not be disturbed by the news of any extraordinary accident which may have happened to her family or friends: for such information hath been known to carry off the labour-pains entirely, after they were begun, and the woman has sunk under her dejection of spirits: and even after delivery, these unseasonable communications have produced such anxiety as obstructed all the necessary excretions, and brought on a violent fever and convulsions, that ended in death.

Of violent *Floodings*. All women, when the placenta separates, and after it is delivered, lose more or less red blood, from the quantity of half a pound, to that of one pound, or even two; but should it exceed this proportion, and continue to flow without diminution, the patient is in great danger of her life: this hazardous hæmorrhage is known by the violence of the discharge, wetting fresh cloths as fast as they can be applied; from the pulse becoming low and weak, and the countenance turning pale; then the extremities grow cold, she sinks into faintings, and, if the discharge is not speedily stopt, or diminished, is seized with convulsions, which often terminate in death.

This dangerous efflux is occasioned by every thing that hinders the emptied uterus from contracting, such as great weakness and lassitude, in consequence of repeated floodings before delivery; the sudden evacuation of the uterus; sometimes, though seldom, it proceeds from part of the placenta's being left in the womb; it may happen when there is another child, or more, still undelivered; when the womb is kept distended with a large quantity of coagulated blood; or when it is inverted, by pulling too forcibly at the placenta.

In this case, as there is no time to be lost, and internal medicines cannot act so suddenly as to answer the purpose, we must have immediate recourse to external application. If the disorder be owing to weakness, by which the uterus is disabled from contracting itself, so that the mouths of the vessels are left open; or, though contracted a little, yet not enough to restrain the hæmorrhage of the thin blood; or if in separating the placenta, the accoucheur has scratched or tore the inner surface or membrane of the womb; in these cases, such things must be used as will assist the contractile power of the uterus, and hinder the blood from flowing so fast into it and the neighbouring vessels; for this purpose, cloths dipped in any cold astringent fluid, such as oxycrate, or red tart wine, may be applied to the back and belly. Some prescribe venesection in the arm, to the amount of five or six ounces, with a view of making revulsion: if the pulse is strong, this may be proper; otherwise, it will do more harm than good. Others order ligatures, for compressing the returning veins at the hams, arms, and neck, to retain as much blood as possible in the extremities and head. Besides these applications, the vagina may be filled with tow or linen rags, dipped in the above-mentioned liquids, in which a little allum, or sachar-saturni hath been dissolved: nay, some practitioners inject proof-spirits warmed, or, soaking them up in a rag or spunge, introduce and squeeze them into the uterus, in order to constringe the vessels.

If the flooding proceeds from another child, the retention of the placenta, or coagulated blood, these ought immediately to be extracted; and if there is an inversion of the uterus, it must be speedily reduced. Should the hæmorrhage, by these methods, abate a little, but still continue to flow, though not in such a quantity as to bring on sudden death, some red wine and jelly ought to be prescribed for the patient, who should take it frequently, and a little at a time; but above all things, chicken or mutton broths, administered in the same manner, for fear of overloading the weakened stomach, and occasioning reachings: these repeated in small quantities, will gradually fill the exhausted vessels, and keep up the circulation. If the pulse continues strong, it will be proper to order repeated draughts of barley-water, acidulated with elixir vitriol: but if the circulation be weak and languid, extract of the bark, dissolved in aq. cinnamomi tenuis, and given in small draughts, or exhibited in any other form, will be serviceable; at the same time, lulling the patient to rest with opiates. These, indeed, when the first violence of the flood is abated, if properly and cautiously used, are generally more effectual than any other medicine.

Of the *After-pains*. After-pains commonly happen when the fibrous part of the blood is retained in the uterus or vagina, and formed into large clots, which are detained by the sudden contraction of the os internum and externum, after the placenta is delivered: or, if these should be extracted, others will sometimes be formed, though not so large as the first, because the cavity of the womb is continually diminishing after the birth. The uterus, in contracting, presses down these coagulums to the os internum; which being again gradually stretched, produces a degree of labour-pains, owing to the irritation of its nerves: in consequence of this uneasiness, the woman squeezes the womb as in real labour; the force being increased, the clots are pushed along, and when they are delivered, she grows easy. The larger the quantity is of the coagulated blood, the severer are the pains, and the longer they continue.

Women in the first child seldom have after-pains; because, after delivery, the womb is supposed to contract and push off the clots with greater force in the first than in the following labours: after-pains may also proceed from obstructions in the vessels, and irritations at the os internum. In order to prevent or remove these pains, as soon as the placenta is separated and delivered, the hand being introduced into the uterus, may clear it of all the coagula. When the womb is felt through the parietes of the abdomen larger than usual, it may be taken for granted, that there is either another child, or a large quantity of this clotted blood; and, which soever it may be, there is a necessity for its being extracted. If the placenta comes away of itself, and the after-pains are violent, they may be alleviated and carried off by an opiate: for, by sleeping and sweating plentifully, the irritation is removed, the evacuations are increased, the os uteri is insensibly relaxed, and the coagula slide easily along. When the discharge of the lochia is small, the after-pains, if moderate, ought not to be restrained; because the squeezing which they occasion, promotes the other evacuation, which is necessary for the recovery of the patient. After-pains may also proceed from an obstruction in some of the vessels, occasioning a small inflammation of the os internum and ligaments; and the squeezing thereby occasioned, may not only help to propel the obstructing fluid, but also (if not too violent) contribute to the natural discharges.

Of the *Lochia*. We have already observed, that the delivery of the child and placenta is followed by an efflux of more or less blood, discharged from the uterus, which, by the immediate evacuation of the large vessels, is allowed to contract itself the more freely, without the danger of an inflammation, which would probably happen in the contraction, if the great vessels were not emptied at the same time: but, as the fluids in the smaller vessels cannot be so soon evacuated, or returned into the vena cava, it is necessary, that, after the great discharge is abated, a slow and gradual evacuation should continue until the womb shall be contracted to near the same size which it had before pregnancy; and to this it attains about the eighteenth or twentieth day after delivery, though the period is different in different women.

When the large vessels are emptied immediately after delivery, the discharge frequently ceases for several hours, until the fluids in the smaller vessels are propelled into the larger, and then begins to flow again, of a paler colour.

The red colour of the lochia commonly continues till the fifth day, though it is always turning more and more serous from the beginning; but, about the fifth day, it flows off a clear, or sometimes (though seldom) of a greenish tint; for, the mouths of the vessels growing gradually narrower, by the contraction of the uterus, at last allow the serous part only to pass: as for the greenish hue, it is supposed to proceed from a dissolution of the cellular or cribriform membrane or mucus, that surrounded the surface of the placenta and chorion; part of which being left in the uterus, becomes livid, decays, and, dissolving, mixes with and tinctures the discharge as it passes along.

Though the lochia, as we have already obferved, commonly continue to the eighteenth or twentieth day, they are every day diminifhing in quantity, and fooneft ceafe in thofe women who fuckle their children, or have had an extraordinary difcharge at firft; but the colour, quantity, and duration, differ in different women: in fome patients, the red colour difappears on the firft, or fecond day; and in others, though rarely, it continues more or lefs to the end of the month: the evacuation in fome is very fmall, in others exceffive: in one woman it ceafes very foon, in another flows during the whole month: yet, all of thefe patients fhall do well.

Some alledge, that this difcharge from the uterus is the fame with that from a wound of a large furface: but it is more reafonable to fuppofe, that the change of colour and diminution of quantity proceed from the flow contraction of the veffels; becaufe, previous to pus, there muft have been lacerations or impofthumes, and in women who have fuddenly died after delivery no wound or excoriation hath appeared upon the inner furface of the womb, which is fometimes found altogether fmooth, and at other times rough and unequal on that part to which the placenta adhered. The fpace that is occupied before delivery, from being fix inches in diameter, or eighteen inches in circumference, will, foon after the birth, be contracted to one third or fourth of thefe dimenfions.

Of the *Milk Fever*. About the fourth day, the breafts generally begin to grow turgid and painful. We have formerly obferved, that, during the time of uterine geftation, the breafts in moft women gradually increafe till the delivery, growing fofter as they are enlarged by the veffels being more and more filled with fluids; and by this gradual diftention they are prepared for fecreting the milk from the blood, after delivery. During the two or three firft days after parturition, efpecially when the woman has undergone a large difcharge, the breafts have been fometimes obferved to fubfide and grow flaccid: and about the third or fourth day, when the lochia begin to decreafe, the breafts fwell again to their former fize, and ftretch more and more, until the milk, being fecreted, is either fucked by the child, or frequently of itfelf runs out at the nipples.

Moft of the complaints incident to women after delivery, proceed either from the obftruction of the lochia in the uterus, or of the milk in the breafts, occafioned by any thing that will produce a fever; fuch as catching cold, long and fevere labour, eating food that is hard of digeftion, and drinking fluids that quicken the circulation of the blood in the large veffels; by which means the fmaller, with all the fecretory and excretory ducts, are obftructed.

The difcharge of the lochia being fo different in women of different conftitutions, and befides in fome meafure depending upon the method of management, and the way of life peculiar to the patient, we are not to judge of her fituation from the colour, quantity, and duration of them, but from the other fymptoms that attend the difcharge; and if the woman feems hearty, and in a fair way of recovery, nothing ought to be done with a view to augment or diminifh the evacuation. If the difcharge be greater than fhe can bear, it will be attended with all the fymptoms of inanition; but as the lochia feldom flow fo violently as to deftroy the patient of a fudden, fhe may be fupported with a proper nourifhing diet, affifted with cordial and reftorative medicines. Let her, for example, ufe broths, jellies, and affes milk; if the pulfe is languid and funk, fhe may take repeated dofes of the confec. cardiac. with mixtures compofed of the cordial waters and volatile fpirits: fubaftringents and opiates frequently adminiftered, with the cort. Peruvian. in different forms, and auftere wines, are of great fervice. On the other hand, when the difcharge is too fmall, or hath ceafed altogether, the fymptoms are more dangerous, and require the contrary method of cure: for now the bufinefs is to remove a too great plenitude of the veffels in and about the uterus, occafioning tenfion, pain, and labour, in the circulating fluids; from whence proceed great heat in the part, reftleffnefs, fever, a full, hard, quick pulfe, pains in the head and back, naufea, and difficulty in breathing. Thefe complaints, if not at firft prevented, or removed by reft and plentiful fweating, muft be treated with venefection and the antiphlogiftick method.

When the obftruction is recent, let the patient lie quiet, and encourage a plentiful diaphorefis, by drinking frequently of warm, diluting fluids, fuch as water-gruel, barley-water, tea, or weak chicken-broth.

Should thefe methods be ufed without fuccefs, and the patient, far from being relieved by reft, plentiful fweating, or a fufficient difcharge of the obftructed lochia, labour under an hot dry fkin, anxiety, and a quick, hard, and full pulfe, the warm diaphoreticks muft be laid afide; becaufe, if they fail of having the defired effect, they muft neceffarily increafe the fever and obftruction, and recourfe be had to bleeding at the arm or ancle to more or lefs quantity, according to the degree of fever and obftruction; and this evacuation muft be repeated as there is occafion. When the obftruction is not total, it is fuppofed more proper to bleed at the ancle than at the arm; and at this laft, when the difcharged is altogether ftopped. Her ordinary drink ought to be impregnated with nitre.

If fhe is coftive, emollient and gently opening glyfters may be occafionally injected; and her breafts muft be fomented and fucked, either by the mouth or pipe-glaffes. If, by thefe means, the fever is abated, and the neceffary difcharges return, the patient commonly recovers; but, if the complaints continue, the antiphlogiftick method muft ftill be purfued. If, notwithftanding thefe efforts, the fever is not diminifhed or removed by a plentiful difcharge of the lochia from the uterus, the milk from the breafts, or by a critical evacuation by fweat, urine, or ftool, and the woman is every now and then attacked with cold fhiverings; an abfcefs or abfceffes will probably be formed in the uterus or neighbouring parts, or in the breafts; and fometimes, the matter will be tranflated to other fituations, and the feat of it foretold from the part's being affected with violent pains: thefe abfceffes are more or lefs dangerous, according to the place in wh ch they happen, the largenefs of the fuppuration, and the good or bad conftitution of the patient.

If when the pains in the epigaftrick regions are violent, and the fever increafed to a very high degree, the patient fhould all of a fudden enjoy a ceffation from pain, without any previous difcharge or critical emption, the phyfician may pronounce that a mortification is begun; efpecially if, at the fame time, the pulfe becomes low, quick, wavering, and intermitting: if the woman's countenance, from being florid, turns dufky and pale, while fhe herfelf, and all the attendants, conceive her much mended; in that cafe, fhe will grow delirious, and die in a very fhort time.

What we have faid on that fubject, regards that fever which proceeds from the obftructed lochia, and in which the breafts may likewife be affected: but the milk fever is that in which the breafts are originally concerned, and which may happen though the lochia continue to flow in fufficient quantity; neverthelefs, they mutually promote each other, and both are to be treated in the manner already explained; namely, by opiates, diluents, and diaphoreticks, in the beginning; and, thefe prefcriptions failing, the obftructions muft be refolved by the antiphlogiftick method defcribed above. The milk-fever alone, when the uterus is not concerned, is not fo dangerous, and much more eafily relieved. Women of an healthy conftitution, who fuckle their own children, have good nipples, and whofe milk comes freely, are feldom or never fubject to this diforder, which is more incident to thofe who do not give fuck, and neglect to prevent the fecretion in time; or, when the milk is fecreted, take no meafures for emptying their breafts. This fever likewife happens to women who try too foon to fuckle, and continue their efforts too long at one time; by which means, the nipples, and confequently the breafts, are often inflamed, fwelled, and obftructed.

In order to prevent too great a turgency in the veffels of the breafts, and the fecretion of milk, in thofe women who do not chufe to fuckle, it will be proper to make external application of thofe things which by their preffure and repercuffive force will hinder the blood from flowing in too great quantity to this part, which is now more yielding than at any other time: for this purpofe, let the breafts be covered with emp. de minio, diapalma, or emp. fimp. fpread upon linen, or cloths dipped in camphorated fpirits, be frequently applied to thefe parts and the armpits; while the patient's diet and drink is of the lighteft kind, and given in fmall quantities. Notwithftanding thefe precautions, a turgency commonly begins about the

the third day; but by reſt, moderate ſweating, and the uſe of theſe applications, the tenſion and pain will ſubſide about the fifth or ſixth day, eſpecially if the milk runs out at the nipples: but if the woman catches cold, or is of a full habit of body, and not very abſtemious, the tenſion and pain increaſing, will bring on a cold ſhivering ſucceeded by a fever; which may obſtruct the other excretions, as well as thoſe of the breaſt.

In this caſe, the ſudorificks above recommended muſt be preſcribed; and if a plentiful ſweat enſues, the patient will be relieved; at the ſame time the milk muſt be extracted from her breaſts, by ſucking with the mouth or glaſſes: ſhould theſe methods fail, and the fever increaſe, ſhe ought to be blooded in the arm; and inſtead of the external applications hitherto uſed, emollient liniments and cataplaſms muſt be ſubſtituted, in order to ſoften and relax. If, in ſpite of theſe endeavours, the fever proceeds for ſome days, the patient is frequently relieved by critical ſweats, a large diſcharge from the uterus, miliary eruptions, or looſe ſtools mixed with milk, which is curdled in the inteſtines; but, ſhould none of theſe evacuations happen, and the inflammation continue with increaſing violence, there is danger of an impoſthume, which is to be brought to maturity, and managed like other inflammatory tumours; and no aſtringents ought to be applied, leſt they ſhould produce ſchirrous ſwellings in the glands.

As the criſis of this fever, as well as of that laſt deſcribed, often conſiſts in miliary eruptions over the whole ſurface of the body, but particularly on the neck and breaſt, by which the fever is carried off, nothing ought to be given, which will either greatly increaſe or diminiſh the circulating force, but ſuch only as will keep out the eruptions. But if, notwithſtanding theſe eruptions, the fever, inſtead of abating, is augmented, it will be neceſſary to diminiſh its force, and prevent its increaſe, by thoſe evacuations we have mentioned above. On the contrary, ſhould the pulſe ſink, the eruptions begin to retreat inwardly, and the morbifick matter be in danger of falling upon the viſcera, we muſt endeavour to keep them out, by opiates and ſudorifick medicines; and here bliſters may be applied with ſucceſs.

Of the *Evacuations* neceſſary at the end of the month after *Delivery*. Thoſe who have had a ſufficient diſcharge of the lochia, plenty of milk, and ſuckle their own children, commonly recover with eaſe; and as the ſuperfluous fluids of the body are drained off at the nipples, ſeldom require evacuations at the end of the month: but if there are any complaints from fullneſs, ſuch as pains and ſtitches, after the twentieth day, ſome blood ought to be taken from the arm, and the belly gently opened by frequent glyſters, or repeated doſes of laxative medicines.

If the patient has tolerably recovered, the milk having been at firſt ſucked or diſcharged from the nipples, and afterwards diſcuſſed, no evacuations are neceſſary before the third or fourth week; and ſometimes not till after the firſt flowing of the menſes, which commonly happens about the fifth week; if they do not appear within that time, gentle evacuations muſt be preſcribed, to carry off the plethora, and bring down the catamenia.

WILDS, a term uſed by our farmers to expreſs that part of a plough by which the whole is drawn forwards.

WILDERNESS, in gardening, a kind of grove of large trees, in a ſpacious garden, in which the walks are made either to interſect each other in angles, or have the appearance of meanders and labyrinths.

Wilderneſſes, ſays Mr. Miller, ſhould always be proportioned to the extent of the gardens in which they are made; for it is very ridiculous to ſee a large wilderneſs planted with tall trees, in a ſmall ſpot of ground; and, on the other hand, nothing can be more abſurd, than to ſee little paltry ſquares, or quarters of wilderneſs work, in a magnificent large garden. As to the ſituation of wilderneſſes, they ſhould never be placed too near the habitation, nor ſo as to obſtruct any diſtant proſpect of the country; there being nothing ſo agreeable as an unconfined proſpect; but where from the ſituation of the place, the ſight is confined within the limits of the garden, nothing can ſo agreeably terminate the proſpect, as a beautiful ſcene of the various kinds of trees judiciouſly planted; and if it is ſo contrived, that the termination is planted circularly, with the concave towards the ſight, it will have a much better effect, then if it end in ſtraight lines or angles. The plants ſhould always be adapted to the ſize of the plantation; for it is very abſurd for tall trees to be planted in the ſmall ſquares of a little garden; and in large deſigns ſmall ſhrubs will have a mean appearance. It ſhould alſo be obſerved, never to plant ever-greens amongſt deciduous trees; but always to place the ever-greens in a wilderneſs in a ſeparate part by themſelves, and that chiefly in ſight.

As to the walks, thoſe that have the appearance of meanders, where the eye cannot diſcover more than twenty or thirty yards in length, are generally preferable to all others, and theſe ſhould now and then lead into an open circular piece of graſs; in the centre of which may be placed either an obeliſk, ſtatue, or fountain; and, if in the middle of the wilderneſs there be contrived a large opening, in the centre of which may be erected a dome or banquetting-houſe ſurrounded with a green plot of graſs, it will be a conſiderable addition to the beauty of the whole. From the ſides of the walks and openings, the trees ſhould riſe gradually one above another to the middle of the quarters, where ſhould always be planted the largeſt growing trees, ſo that the heads of all the trees may appear to view, while their ſtems will be hid from the ſight. Thus in thoſe parts which are planted with deciduous trees, roſes, honey-ſuckles, ſpiræa frutex, and other kinds of low flowering ſhrubs, may be planted next the walks and openings; and at their feet, near the ſides of the walks, may be planted primroſes, violets, daffodils, &c. not in a ſtraight line, but ſo as to appear accidental, as in a natural wood. Behind the firſt row of ſhrubs ſhould be planted ſyringas, althæa, frutex, mezereons, and other flowering ſhrubs of a middle growth; and theſe may be backed with many other ſorts of trees, riſing gradually to the middle of the quarters.

The part planted with ever-greens, may be diſpoſed in the following manner, viz. in the firſt line next the great walks, may be placed the lauruſtinus, boxes, ſpurge laurel, juniper, ſavin, and other dwarf ever-greens. Behind theſe may be placed laurels, hollies, arbutuſes, and other ever-greens of a larger growth. Next to theſe may be planted alternuſes, phyllireas, yews, cypreſſes, Virginian cedars, and other trees of the ſame growth; behind theſe may be planted Norway and ſilver firs, the true pine, and other ſorts of the fir growth; and in the middle ſhould be planted Scotch pines, pinaſter, and other of the larger growing ever-greens, which will afford a moſt delightful proſpect, if the different ſhades of the greens are curiouſly intermixed.

But beſide the grand walks and openings (which ſhould always be laid with turf, and kept well mowed) there ſhould be ſome ſmaller ſerpentine walks through the middle of the quarters, where perſons may retire for privacy; and by the ſides of theſe private walks may alſo be ſcattered ſome wood-flowers and plants, which, if artfully planted, will have a very good effect.

In the general deſign for theſe wilderneſſes, there ſhould not be a ſtudied and ſtiff correſpondency between the ſeveral parts; for the greater diverſity there is in the diſtribution of theſe, the more pleaſure they will afford.

WILL, or *laſt* WILL, in law, ſignifies the declaration of a man's mind and intent relating to the diſpoſition of his lands, goods, or other eſtate, or of what he would have done after his death.

In the common law, there is a diſtinction made between a will and a teſtament; as that is called a will, where lands or tenements are given; and when the diſpoſition concerns goods and chattels alone, it is termed a teſtament.

In the making of a will there are theſe ſeveral rules to be obſerved, viz. 1. That it be done while the teſtator is of ſound mind and memory. 2. That there be two parts thereof, the one to remain in the hands of the party that made it, and the other in the cuſtody of ſome friend, in order to render it leſs liable to be ſuppreſſed after the teſtator's death. 3. That the whole be written in one hand-writing, and, if poſſible, in one ſheet of paper or parchment. 4. In caſe there be more ſheets than one, that the teſtator ſign and ſeal every ſheet, before the witneſſes preſent at the execution.

WILL *with a Wiſp*, or *Jack with a Lanthorn*, a meteor known among the people under theſe names, but more uſually among authors, under that of ignus fatuus.

This meteor is chiefly ſeen in ſummer nights, frequenting

ing meadows, marfhes, and other moift places. It feems to arife from a vifcous exhalation, which being kindled in the air, reflects a fort of thin flame in the dark, without any fenfible heat.

It is often found flying along rivers, hedges, &c. by reafon it there meets with a ftream of air to direct it. The ignis fatuus, fays Sir Ifaac Newton, is a vapour fhining without heat; and there is the fame difference between this vapour and flame, as between rotten wood fhining without heat, and burning coals of fire.

WILLOW, *Salix*, in botany, a genus of trees, producing male and female flowers on feparate plants; they are difpofed in oblong imbricated katkins, and are both deftitute of petals: the male flower confifts of a cylindrick nectarious honey gland in the centre of each fcale; the ftamina are two flender erect filaments, topped with quadrilocular twin antheræ; the female flower contains an ovate narrow germen, crowned by two bifid erect ftigmas; the fruit is an oval, awl-fhaped, unilocular capfule, opening with two revolute valves, and containing many fmall ovate feeds crowned with a hairy down.

There are various kinds of willows, fome of which grow to the fize of a large tree, while other forts are of a more humble growth, they all delight in moift marfhy places, and on the fides of brooks and rivers. The propagation of willows is eafily effected either by fets or cuttings: thofe forts which are cultivated for their timber are generally planted from branches eight or nine feet long; thefe are commonly fharpened at their lower end, and thruft into the ground by the fides of ditches and banks, where the ground is moift, in which they will freely grow. The beft feafon for planting is early in the fpring, though they will fucceed if planted in autumn.

Willow is of ufe to make wooden heels for fhoes, for cricket bats, as alfo to the turners in many kinds of light wares: the loppings are ufed for feveral purpofes; and the ofier which belongs to this genus is the moft proper for making bafkets.

WIN, in the beginning or end of the names of places, fignifies that fome great battle was fought, or a victory gained there.

WIND, *Ventus*, in phyfiology, a ftream of air, flowing out of one place, or region, into another.

As the air is a fluid, its natural ftate is that of reft, which it endeavours always to keep or retrieve by an univerfal equilibrium of all its parts. When, therefore, this natural equilibrium of the atmofphere happens by any means to be deftroyed in any part, there neceffarily follows a motion of all the circumjacent air towards that part to reftore it; and this motion of the air is what we call wind.

Hence, with refpect to that place where the equilibrium of the air is difturbed, we fee the wind may blow from every point of the compafs at the fame time; and thofe who live northwards of that point, have a north wind; thefe who live fouthwards, a fouth wind; and fo of the reft: but thofe who live on the fpot, where all thefe winds meet and interfere, are oppreffed with turbulent and boifterous weather, whirlwinds, and hurricanes; with rain, tempeft, lightening, thunder, &c. For fulphureous exhalations from the fouth, torrents of nitre from the north, and aqueous vapours from every part, are there confufedly huddled, and violently blended together, and rarely fail to produce the phænomena above mentioned.

Many are the particular caufes which produce wind, by interrupting the equipoife of the atmofphere; but the moft general caufes are two, viz. heat, which, by rarifying the air, makes it lighter in fome places than it is in others; and cold, which by condenfing it, makes it heavier. Hence it is, that in all parts over the torrid zone, the air being more rarified by a greater quantity of the folar rays, is much lighter than in the other parts of the atmofphere, and moft of all over the equitorial parts of the earth. And fince the parts at the equator are moft rarified, which are near the fun; and thofe parts are, by the earth's diurnal rotation eaftward, continually fhifting to the weft; it follows, that the parts of the air which lie on the weft fide of the point of the greateft rarefaction, and, by flowing towards it, meet it, have lefs motion than thofe parts on the eaft fide of the faid point, which follow it; and therefore the motion of the eaftern air would prevail againft that of the weftern air, and fo generate a continual eaft wind, if this were all the effect of that rarefaction. But we are to confider, that as all the parts of the atmofphere are fo greatly rarified over the equator, and all about the poles greatly condenfed by extreme cold, this heavier air from either pole is conftantly flowing towards the equator, to reftore the balance deftroyed by the rarefaction and levity of the air over thofe regions: hence, in this refpect alone, a conftant north and fouth wind would be generated.

The fun, by heating that part of the air over which he is vertical, and confequently rendering it lighter, will, by his apparent motion from eaft to weft, caufe a continual ftream of air to flow in that direction.

This being clearly underftood, all the reft is eafy; for no one can find it difficult to conceive how the cold air from each pole muft neceffarily fet in towards the equator directly, where meeting and interfering with the eaftern current, it does with that compound a new direction for the moving air which lies between both the former, viz. a north-eaft current on the north fide, and a fouth-eaft on the fouth fide: all which naturally refults from the doctrine of the compofition of oblique forces.

And this we find to be verified in the general trade-winds, which conftantly blow from the north-eaft and fouth-eaft, to about thirty degrees on each fide the equator, where thofe parts are over the open ocean, and not affected with the reflection of the fun-beams from the heated furface of the land; for in this cafe the wind will always fet in upon the land, as on the coaft of Guinea, and other parts of the torrid zone, we know it does.

Velocity and force of the WIND. As the motion of the air has a greater or lefs velocity, the wind is ftronger or weaker; and it is found from obfervation, that the velocity of the wind is various, from the rate of one to fifty or fixty miles per hour. The beft way to prove this, is to chufe a free open place, where the wind or current of air is not at all interrupted, but flows uniformly, or as much fo as the undulatory ftate of the atmofphere will admit: in fuch a place, a feather, or other very light body, is to be let go in the wind; and then, by a half-fecond watch, or pendulum, you muft obferve nicely to what diftance it is carried in any number of half-feconds, or in how many half-feconds it has paffed over a given or meafured fpace. This will give the rate of velocity in the wind per fecond, and of courfe per hour; which has been found, at a medium, to be twelve or fifteen miles per hour; even the moft vehement wind does not fly above fifty or fixty miles per hour; and fometimes the wind is fo flow, as not to exceed the velocity of a perfon riding or walking in it; and in that cafe, if the perfon goes with the wind, he finds no wind at all, becaufe there is no difference of velocity, or no relative wind, which is that only which we are fenfible of, whilft in motion.

Cardinal WINDS, are thofe which blow from the eaft, weft, north, and fouth, which are called cardinal points.

Collateral WINDS, are thofe which blow between the cardinal points. The number of thefe is infinite, as the number of points they blow from are; a few of them only are confidered in practice, and thefe have names compounded of the cardinal points between which they blow.

WIND-*Gun*, or *Air-Gun*. See AIR-GUN.

WIND-*Mill*, a kind of mill, the internal parts of which are much the fame with thofe of a water-mill; from which however it differs, in being moved by the impulfe of the wind upon its vanes, or fails, which are to be confidered as a wheel on the axle.

In mills built of wood, the whole body of the mill turns round to the wind, on a tampin, or perpendicular poft; but in thofe of ftone, only the upper part turns in this manner; in order to which, the roof is built turret-wife, the turret being encompaffed with a wooden ring, in which is a groove, at the bottom of which a number of brafs truckles are placed at certain diftances; and within this groove is another ring, upon which the whole turret ftands. To the upper or moveable ring are connected

nected beams with a rope, by means of which, and a windlafs below, the top of the machine, together with the fails, may be turned round, and put in the direction required.

Pofition of, and force of the WIND *upon the Sails.* As to the pofition of the fails, we muft confider, that if they are placed direct to the wind, or at right angles to the axis of the mill, they will receive the whole force of the wind, which in this cafe will tend to blow them forward, and confequently to blow down the mill; which pofition of courfe cannot be admitted.

If the fails are fet right to the wind, or parallel with the axis of the mill, it is plain, that in that pofition, the wind cannot act upon them at all, and therefore they cannot be turned round, nor the mill put in motion; which pofition of the fails muft likewife be rejected.

Since neither the direct nor right pofition of the fails will do, an oblique pofition muft, as there can be no other; and accordingly the fails of vertical wind-mills are always in an oblique pofition to the wind.

The force of the wind on the fail will be as the fquare of the fign of incidence; but if we fuppofe the velocity of the wind to vary, the force thereof will be as the fquare of the velocity; for the greater the velocity, the greater will be the ftroke of each fingle particle, and alfo the greater will be the number of particles coming upon the fail in the fame time; the force will be therefore as the fquares of the velocity.

Again, if the area of the fail be variable, the force of the wind will be directly as the area or fuperficies of the fail; becaufe the number of particles of the air coming upon it, will always be proportional thereto, and confequently the force with which they ftrike it.

When the area of the fail and its pofition in refpect to the wind, continue the fame, the force which turns the fails will be as the fquares of the velocity; and fince the wind fcarce ever blows with one uniform velocity, but varies with almoft every blaft, the force upon the fail will be much more variable and unequal; and therefore the action or working of a wind-mill cannot be fo equal, uniform, or fteady, as that of a water-mill, whofe power is always of the fame tenor, when the jet of water is fo.

When the angle of incidence begins to be oblique, the force increafes with the obliquity of the faid angle to a certain number of degrees; becaufe that part of the force which is parallel to the axis, becomes lefs in proportion to that which is perpendicular to it: but after it has paffed this limit, it again decreafes and becomes nothing, when the angle of incidence vanifhes; as is eafy to underftand, by confidering that the quantity of wind on the fail does in this cafe continually decreafe.

There is therefore one certain pofition of the fail, in which the force of the wind is greateft of all upon it, or a maximum: and this the ingenious Mr. Parent has fhewn to be $54° 44'$.

But this angle is only that which gives the wind the greateft force to put the fail in motion, but not the angle which gives the force of the wind a maximum upon the fail when in motion. What this angle is, Mr. Mac Laurin has fhewn in his book of fluxions, to which we refer the reader.

Mr. Parent has alfo fhewn, that an elliptick form of the fails is better than a parallelogram, or long fquare; and that the beft pofition of the fail is not that which is common, viz. with its longeft fide or diameter parallel to the axis of the fail; but, on the contrary, it ought to be perpendicular to it.

There are three things yet wanting to the perfection of a wind-mill. 1. Some contrivance in the nature of a fly, to regulate the motion of the train, under the unequal and irregular impulfe of the wind. 2. Some other contrivance to fupply the hopper, or ftones, with more or lefs corn, in proportion to the greater or lefs ftrength of the wind. 3. A method of altering the angle of the fail's obliquity, from its maximum of $54° 44'$, at the beginning of the motion, to its minimum, when in motion.

WIND, in the menage. A horfe that carries in the wind, is one that toffes his nofe as high as his ears, and does not carry handfomely. The difference between carrying in the wind, and beating upon the hand, is, that the horfe who beats upon the hand, fhakes his head, and refifts the bridle; but he who carries in the wind, puts up his head without fhaking, and only fometimes beats upon the hand. The oppofite to carrying in the wind, is arming and carrying low.

WIND-FLOWER, *Anemonie*, in botany. See the article ANEMONIE.

WIND-GALL, a name given by our farriers to a diftemperature of horfes. In this cafe there are bladders full of a corrupt jelly, which, when let out, is thick, and of the colour of the yolk of an egg. They vary in fize, but are more ufually fmall than large. Their place is about the fetlock-joint, and they grow indifferently on all four legs, and are often fo painful, efpecially in the fummer feafon, when the weather is hot, and the ground dry and hard, that they make the creature frequently ftumble, or even fall down. The general method of cure is to open the fwelling, about the length of a bean, and to prefs out the jelly: when this is done they apply a mixture of the oil of bays, and the white of an egg, covering it with tow. Another method is, after the jelly is all fqueezed out, to wrap round the part a wet woollen cloth, and then applying a taylor's hot iron, this is to be rubbed over till the moifture is carried away; it is then to be daubed all over with pitch, maftich, and refin, boiled together, laying tow in plenty over all. The wind-galls that are fituated near the finews, are much the moft painful of all, and fooneft make the horfe lame.

The general caufe of wind-galls is fuppofed to be extreme work or exercife in hot weather; but it is to be obferved, that thofe horfes which have long joints, will be wind-galled if they work never fo little. The worft wind-galls are thofe of the hinder legs; all the above-mentioned methods will frequently mifs of fuccefs in thefe, and nothing but fire will cure them.

WIND-HATCH, in mining, a term ufed to exprefs the place at which the ore is taken out of the mines.

WIND-SHOCK, a name given by our farmers to a diftemperature to which fruit-trees, and fometimes timber-trees, are fubject.

Mortimer is of opinion, that the wind-fhock is a fort of bruife and fhiver throughout the whole fubftance of the tree; but that the bark being often not affected by it, it is not feen on the outfide, while the infide is twifted round, and greatly injured.

It is by fome fuppofed to be occafioned by high winds; but others attribute it to lightening. Thofe trees are moft ufually affected by it, whofe boughs grow more out on one fide than on the other.

The beft way of preventing this in valuable trees, is to take care, in the plantation, that they are fheltered well, and to cut them frequently in a regular manner, while young. The winds not only twift trees in this manner, but they often throw them wholly down; in this cafe the common method is to cut up the tree for firing, or other ufes; but if it be a tree that is worth preferving, and it be not broken, but only torn up by the roots, it may be proper to raife it again, by the following method: let a hole be dug deep enough to receive its roots, in the place where they before were: let the ftraggling roots be cut off, and fome of the branches, and part of the head of the tree; then let it be raifed; and when the torn-up roots are replaced in the earth, in their natural fituation, let them be well covered, and the hole filled up with rammed earth; the tree will, in this cafe, grow well, and perhaps better than before. If nature be left to herfelf, and the tree be not very large, the pulling off the roots will raife it.

WINDAGE *of a Gun*, the difference between the diameter of the bore, and the diameter of the ball.

WINDLASS, or WINDLACE, a machine ufed to raife huge weights withal, as guns, ftones, anchors, &c.

It is very fimple, confifting only of an axis, or roller, fupported horizontally at the two ends by two pieces of wood and a pulley: the two pieces of wood meet at top, being placed diagonally, fo as to prop each other; the axis, or roller, goes through the two pieces, and turns in them. The pulley is faftened at top where the pieces join. Laftly, there are two ftaves or hand fpikes go through the roller, whereby it is turned, and the rope which comes over the pulley is wound off and on the fame.

WINDOW,

WINDOW, q. d. wind-door, an aperture or open place in the wall of a houſe, to let in the wind and light. See House.

We have various forms of windows, as, arched windows, circular windows, elliptical windows, ſquare and flat windows, round windows, oval windows, Gothick windows, ruſtick windows, and ſky-lights.

The chief rules in regard to windows are, 1. That they be as few in number, and as moderate in dimenſions, as may conſiſt with other due reſpects; inaſmuch as all openings are weakenings. 2. That they be placed at a convenient diſtance from the angles, or corners of the building; becauſe that part ought not to be enfeebled, whoſe office is to ſupport and faſten all the reſt of the building. 3. That care be taken that the windows are all equal one with another, in their rank and order; ſo that thoſe on the right hand may anſwer to thoſe on the left, and thoſe above the right over thoſe below; for this ſituation of windows will not only be handſome and uniform, but alſo the void being upon the void, and the full upon the full, it will be a great ſtrengthening to the whole fabrick.

As to their dimenſions, care is to be taken not to give them more or leſs light than is needful; that is, to make them no bigger, nor leſs, than is convenient; therefore, regard is to be had to the bigneſs of the rooms which are to receive the light: it is evident, that a great room needs more light, and, conſequently, a greater window than a little room. The apertures of windows, in middle-ſized houſes, may be four and a half, or five feet, between the jaumbs, and in greater buildings ſix and a half, or ſeven feet, and their height may be double their length at the leaſt. But in high rooms, or large buildings, their height may be a third, a fourth, or half a breadth more than double their length. Theſe are the proportions of the windows for the firſt ſtory; and according to theſe muſt the upper ſtories be for breadth; but, as for height, they muſt diminiſh: the ſecond ſtory may be one-third part lower than the firſt, and the third one-fourth part lower than the ſecond.

WINE, *Vinum*, a briſk, agreeable, ſpirituous, and cordial liquor, drawn from vegetable bodies and fermented. See Fermentation.

The character of wine, according to Boerhaave, is, that the firſt thing it affords by diſtillation, be a thin, oily, inflammable fluid, called a ſpirit.

This diſtinguiſhes wines from another claſs of fermented vegetable juices, viz. vinegar; which, inſtead of ſuch ſpirit, yields, for the firſt thing, an acid, uninflammable matter.

All ſorts of vegetables, fruits, ſeeds, roots, &c. afford wine; as grapes, currants, mulberries, elder-berries, cherries, apples, pulſe, beans, peaſe, turneps, radiſhes, and even graſs itſelf. Hence, under the claſs of wines, or vinous liquors, come not only wines abſolutely ſo called, but ale, cyder, &c. See Vinegar.

Wine is, in a more peculiar manner, appropriated to that which is drawn from the fruit of the vine, by ſtamping its grapes in a vat, or cruſhing and expreſſing the juiceout of them in a preſs, and then fermenting them, &c.

The goodneſs of wine conſiſts in its being neat, dry, fine, bright, and briſk, without any taſte of the ſoil, of a clean ſteady colour, having a ſtrength without being heady, a body without being ſour, and keeping without growing hard or eager. The difference of flavour, taſte, colour, and body, in wines, is perhaps, as much owing to the different manner and time of preſſing, gathering, and fermenting the grape, as to any difference of the grape itſelf.

In Hungary, whence tockay and ſome of the richeſt and higheſt-flavoured wines come, they are extremely curious in theſe reſpects: for their prime and moſt delicate wines, the grape is ſuffered to continue upon the vine till it is half dried by the heat of the ſun: and, if the ſun's heat ſhould not prove ſufficient, they are dried by the gentle heat of a furnace, and then picked one by one from the ſtalks; the juice of this grape, when preſſed out, is of a fine flavour, and ſweet as ſugar: this, after due fermentation, is kept for a year, and then racked from the leys, when it proves a generous, oily, rich wine, and is ſold at a very high rate.

The Hungarians prepare a ſecond ſort of wine by collecting together the better kind of grapes, carefully picking the fruit from the ſtalks, and then preſſing out the juice: this is extremely ſweet, and is made richer by infuſing in it, after it has fermented for ſome days, a ſufficient quantity of half-dried grapes. This wine, beſides being very ſweet, is oily, and of a grateful taſte, and retains theſe qualities for a long time.

There is a third ſort, made from the pure juice of this kind of grape, without any addition. This is a more briſk and lively wine, and far leſs ſweet.

They likewiſe prepare a fourth ſort, from grapes of different goodneſs mixed together; this, though not ſo generous, is nevertheleſs an excellent wine.

Theſe Hungarian wines are remarkable for preſerving their ſweetneſs, and for the delicacy of their taſte and ſmell; they, likewiſe, do not grow eaſily vapid, and may be kept in perfection for many years.

Wine being a liquor moſtly of foreign produce, the divers names, forms, kinds, diſtinctions, &c. thereof, are borrowed from the countries where it is produced; the principal whereof, at this day, is France, to wines of which country, a good part of what we have to ſay of this noble liquor, will more immediately belong.

Wine, in France, is diſtinguiſhed from the ſeveral degrees and ſteps of its preparation, into, 1. Mere goutte, mother drop, which is the virgin wine, or that which runs of itſelf out at the top of the vat wherein the grapes are laid, before the vintager enters to tread or ſtamp the grapes. 2. Muſt, ſurmuſt, or ſtum, which is the wine or liquor in the vat, after the grapes have been trod or ſtamped. 3. Preſſed wine, being that ſqueezed with a preſs out of the grapes half bruized by the treading. The huſks left of the grapes are called rope, murk, or mark, by throwing water upon which, and preſſing them afreſh, they make a liquor for ſervants uſe, anſwering to our cyderkin, and called boiſſon, which is of ſome uſe in medicine, in the cure of diſorders occaſioned by the viſcid humours. 4. Sweet wine is that which has not yet worked orfermented. 5. Bouru, that which has been prevented working by caſting in cold water. 6. Worked wine, that which has been let work in the vat, to give it a colour. 7. Boiled wine, that which has had a boiling before it worked, and which by that means ſtill retains its native ſweetneſs. 8. Strained wine, that made by ſteeping dry grapes in water, and letting it ferment of itſelf.

Wines are alſo diſtinguiſhed with regard to their colour, into white wine, red wine, claret wine, pale wine, roſe or black wine; and, with regard to their country, or the ſoil that produces them, into French wines, Spaniſh wines, Rheniſh wines, Hungary wines, Greek wines, Canary wines, &c. and more particularly into Port wine, Madeira wine, &c.

Method of making, fining, &c. Wine. In the ſouthern parts of France, their way is with red wines to tread or ſqueeze the grapes between the hands, and to let the whole ſtand, juice and huſks, till the tincture be to their liking; after which they preſs it. But for white wines, they preſs the grapes immediately; when preſſed they tun the muſt and ſtop up the veſſel, only leaving the depth of a foot or more to give room for it to work. At the end of ten days they fill this ſpace with ſome other proper wine, that will not provoke it to work again. This they repeat from time to time, new wine ſpending itſelf a little before it comes to perfection.

The uſual method of fining down wines, ſo as to render them expeditiouſly bright, clear, and fit for uſe, is this: Take an ounce of iſinglaſs, beat it into thin ſhreds with a hammer, and diſſolve it, by boiling, in a pint of water; this when cold becomes a ſtiff jelly. Whiſk up ſome of this jelly into a froth with a little of the wine intended to be fined, then ſtir it well among the reſt in the caſk, and bung it down tight; by this means the wine will become bright in eight or ten days.

This method, however, is found to be beſt ſuited to the white wines; for the red ones, the wine-coopers commonly uſe the whites of eggs beat up to a froth, and mixed in the ſame manner with their wines.

They fine it down alſo by putting the ſhavings of green beech into the veſſel, having firſt taken off all the rind, and boiled them an hour in water to extract their rankneſs, and afterwards dried them in the ſun, or in an oven. A buſhel of theſe ſerve for a tun of wine: and being

being mashed, they serve again and again, till almost quite consumed.

For English wine, the method recommended by Mortimer, is first to gather the grapes when very dry, to pick them from the stalks, then to press them, and let the juice stand twenty-four hours in a vat covered. Afterwards to draw it off from the gross lees, and then put it up in a cask, and to add a pint or quart of strong red or white port to every gallon of juice, and let the whole work, bunging it up close, and letting it stand till January; then bottle it in dry weather. Bradley chuses to have the liquor, when pressed, stand with the husks, stalks, and all in the vat, to ferment for fifteen days.

The method of converting white wine into red, so much practised by the modern wine-coopers, Dr. Shaw observes, is this: Put four ounces of turnesole rags into an earthen vessel, and pour upon them a pint of boiling water; cover the vessel close, and leave it to cool; strain off the liquor, which will be of a fine deep red, inclining to purple. A small portion of this colours a large quantity of wine. This tincture might be either made in brandy, or mixed with it, or else made into a sirup, with sugar, for keeping. A common way with the wine-coopers is to infuse the rags cold in wine for a night or more, and then wring them out with their hands; but the inconveniency of this method is, that it gives the wine a disagreeable taste; or what is commonly called the taste of the rag; whence the wines thus coloured, usually pass among judges for pressed wines, which have all this taste from the canvas rags in which the lees are pressed.

The way of extracting the tincture, as here directed, is not attended with this inconvenience; but it loads the wine with water; and if made into a sirup, or mixed in brandy, it would load the wine with things not wanted, since the colour alone is required. Hence the colouring of wines has always its inconveniencies.

In those countries which do not produce the tinging grape, which affords a blood-red juice, wherewith the wines of France are often stained, in defect of this, the juice of elder-berries is used, and sometimes logwood is used at Oporto.

The colour afforded by the method here proposed, gives wine the tinge of the Bourdeaux-red, not the port; whence the foreign coopers are often distressed for want of a proper colouring for red wines in bad years. This might perhaps be supplied by an extract made by boiling stick-lack in water. The skins of tinging grapes might also be used, and the matter of the turnesole procured in a solid form, not imbibed in rags.

Stahl observes, that it is a common accident, and a disease in wines, to be kept too hot; which is not easy to cure when it has been of any long continuance, otherwise it may be cured by introducing a small artificial fermentation, that new ranges the parts of the wine, or rather recovers their former texture: but the actual exposing of wine to the fire, or the sun, presently disposes it to turn eager; and the making it boiling hot, is one of the quickest ways of expediting the process of making of vinegar.

On the other hand, wine kept in a cool vault, and well secured from the external air, will preserve its texture intire in all the constituent parts, and sufficiently strong for many years, as appears not only from old wines, but other foreign fermented liquors, particularly those of China, prepared from a decoction of rice, which being well closed down in a vessel, and buried deep under ground, will continue for a long series of years, rich, generous, and good, as the histories of that country universally agree in assuring us.

The most general remedy hitherto known for all the diseases of wines, is a prudent use of tartarized spirit of wine, which not only enriches but disposes all ordinary wines to grow fine.

If either by fraud or accident a larger portion of water is mixed with wine than is proper for its consistence, and no way necessary or essential, this superfluous water does not only deprave the taste, and spoil the excellence of the wine, but also renders it less durable; for humidity in general, and much more a superfluous aqueous humidity, is the primary and restless instrument of all the changes that are brought on by fermentation. It may, doubtless, therefore be useful, and sometimes absolutely necessary, to take away this superfluous water from the other part which strictly and properly constitutes the wine. This has been agreed upon all hands as a thing proper; but the manner of doing it has not been well agreed on; some have proposed the effecting it by means of heat and evaporation, others by percolation, and others by various other methods, all found unsuccessful when brought to the trial; but the way proposed by Dr. Shaw from Stahl, is the most certain and commodious; this is done by a concentration of the wine, not by means of heat, but of cold.

If any kind of wine, but particularly such as has never been adulterated, be in a sufficient quantity, as that of a gallon or more, exposed to a sufficient degree of cold in frosty weather, or be put into any place where ice continues all the year, as in our ice-houses, and there suffered to freeze, the superfluous water that was originally contained in the wine, will be frozen into ice, and will leave the proper and truly essential part of the wine unfrozen, unless the degree of cold should be very intense, or the wine but weak and poor. This is the principle on which Stahl founds his whole system of condensing wines by cold. When the frost is moderate, the experiment has no difficulty, because not above a third or fourth part of the superfluous water will be froze in a whole night; but if the cold be very intense, the best way is, at the end of a few hours, when a tolerable quantity of ice is formed, to pour out the remaining fluid liquor, and set it in another vessel to freeze again by itself.

If the vessel, that thus by degrees receives the several parcels of the condensed wine be suffered to stand in the cold freezing place, where the operation is performed, the quantity lying thin in the pouring out, or otherwise, will be very apt to freeze anew; and if it be set in a warm place, some of this aqueous part thaws again, and so weakens the rest. The condensed wine, therefore, should be emptied in some place of a moderate degree as to cold or heat, where neither the ice may dissolve nor the vinous substance mixed among it be congealed. But the best expedient of all is to perform the operation with a large quantity of wine, or that of several gallons, where the utmost exactness, or the danger of a trifling waste, need not be regarded.

By this method, when properly performed, there first freezes about one third part of the whole liquor; and this is properly the more purely aqueous part of it, insomuch that when all the vinous fluid is poured off, to be again exposed to a concentration, the ice remaining behind, from this first freezing, being set to thaw in a warm place, dissolves into a pure and tasteless water. The frozen part, or ice, consists only of the watery part of the wine, and may be thrown away, and the liquid part retains all the strength, and is to be preserved. This will never grow sour, musty, or mouldy afterwards, and may at any time be reduced to wine of the common kind again, by adding to it as much water as will make it up to the quantity that it was before.

Wines in general may by this method be reduced to any degree of vinosity or perfection.

The benefit and advantage of this method of congelation, if reduced to practice in the large way, in the wine countries, must be evident to every body. Concentrated wines, in this manner, might be sent into foreign countries, instead of wine and water, which is usually now sent; the wines they export being loaded, and in danger of being spoiled, by three or four times their own quantity of unnecessary, superfluous, and prejudicial water.

An easy method of recovering pricked wines may be learned from the following experiment: Take a bottle of red-port that is pricked, add to it half an ounce of tartarized spirit of wine, shake the liquor well together, and set it by for a few days, and it will be found very remarkably altered for the better.

This experiment depends upon the useful doctrine of acids and alkalies. All perfect wines have naturally some acidity, and when this acidity prevails too much, the wine is said to be pricked; which is truly a state of the wine tending to vinegar: but the introduction of a fine alkaline salt, such as that of tartar, imbibed by spirit of wine, has a direct power of taking off the acidity; and the spirit of wine also contributes to this, as a great preservative in general of wines. If this operation be dexterously performed, pricked wines may be absolutely re-

covered

covered by it, and remain faleable for fome time: and the fame method may be ufed to malt liquors juft turned four.

The age of wine is properly reckoned by leaves; thus they fay of wine two, four, or fix leaves, to fignify wine of two, four, or fix years old; taking each new leaf put forth by the vine, fince the wine was made, for a year.

WINE is alfo a denomination applied in medicine and pharmacy to divers mixtures and compofitions wherein the juice of the grape is a principal ingredient.

With regard to the medical ufes of wines, it is obferved, that among the great variety of wines in common ufe among us, five are employed in the fhops as menftrua for medicinal fimples: that is, the vinum album Hifpanicum, or mountain wine; the vinum album Gallicum, or French white wine; the Canary wine, or fack; the Rhenifh wine; and the red port.

The effects of thefe liquors on the human body, are to chear the fpirits, warm the habit, promote perfpiration, render the veffels full and turgid, raife the pulfe, and quicken the circulation. The effects of the full-bodied wines are much more durable than thofe of the thinner; all fweet wines, as Canary, abound with a glutinous, nutritious fubftance, whilft the others are not nutrimental, or only accidentally fo, by ftrengthening the organs employed in digeftion. Sweet wines, in general, do not pafs off freely by urine; and they heat the conftitution more than an equal quantity of any other, though containing full as much fpirit; red port, and moft of the red wines, have an aftringent quality, by which they ftrengthen the tone of the ftomach, and thus prove ferviceable for reftraining immoderate fecretions; thofe which are of an acid nature, as rhenifh, pafs freely by the kidnies, and gently loofen the belly. It is fuppofed that thefe laft exafperate and occafion gouty calculous diforders, and that new wines of every kind have this effect.

WINE-SPIRIT, a term ufed by our diftillers, and which they feem to mean the fame thing with the phrafe of fpirit of wine; but they are taken in very different fenfes in the trade.

Spirit of wine is the name given to the common malt-fpirit, when reduced to an alcohol, or totally inflammable ftate; but the phrafe, wine-fpirit, is ufed to exprefs a very clean and fine fpirit, of the ordinary proof ftrength, and made in England from wines of foreign growth.

The way of producing it is by fimple diftillation, and it is never rectified any higher than common bubble proof. The feveral wines of different natures, yield very different proportions of fpirit; but, in general, the ftrongeft yield one-fourth, the weakeft in fpirits one-eighth part of proof-fpirit; that is, they contain from a fixteenth to an eighth part of their quantity of pure alcohol.

Wines that are a little four, ferve not at all the worfe for the purpofes of the diftiller, they rather give a greater vinofity to the produce. This vinofity is a thing of great ufe in the wine-fpirit, whofe principal ufe is to mix with another, that is tartarized, or with a malt-fpirit, rendered alkaline by the common method of rectification. All the wine-fpirits made in England, even thofe from the French wines, appear very greatly different from the common French brandy; and this has given our diftillers a notion that there is fome fecret art practifed in France, for the giving the agreeable flavour to that fpirit; but this is without foundation.

WING, *Ala*, that part of a bird, infect, &c. whereby it is enabled to fly.

Warbling of the WINGS, in falconry, is when a hawk, after having mantled herfelf, croffes her wings over her back.

WINGS, in heraldry, are born fometimes fingle, fometimes in pairs, in which cafe they are called conjoined; when the points are downward, they are faid to be inverted; when up, elevated.

WING, *Ala*, or *Axilla*, in botany, the angle which the leaves of a plant, or the pedicles of the leaves, form with the ftem, or a branch of the plant.

This angle is commonly acute, and always turned upward. It has its name from its refembling the angle which the wings of a bird form with the body; or rather, from the angle which a man's arms makes with his trunk, which is alfo called ala, wing.

WINGS, in gardening, &c. denote fuch branches of trees, or other plants, as grow up afide of each other.

La Quintiny fays, the term is particularly applied to artichoaks, whofe wings, or alæ, are the lefs heads or fruits that grow up with the principal one, on the fame ftalk.

WINGS, *Alæ*, in the military art, are the two flanks or extremes of an army, ranged in form of battle; being the right and left fides thereof, and including the main body.

The cavalry are always pofted in the wings; i. e. on the flanks, or the right and left fides of each line; to cover the foot in the middle.

Pan, one of Bacchus's captains, is faid to have been the firft inventor of this method of ranging an army; whence, fay they, it is that the ancients painted him with horns on his head; what we call wings, being by them called cornua, horns.

This, at leaft, is certain, that the method of arranging in wings is very ancient. The Romans, we know, ufed the term alæ, or wings, for two bodies of men in their army; one on the right, the other on the left, confifting each of 400 horfe, and 4200 foot ufually, and wholly made up of confederate troops. Thefe were defigned to cover the Roman army, as the wings of a bird cover its body.

The troops in thefe wings they called alares, and alares copiæ; and we at this day diftinguifh our armies into the main-body, the right and left wings.

WINGS are alfo ufed for the two files that terminate each battalion, or fquadron, on the right and left. The pikes are ranged in the middle, and the mufqueteers in the wings.

WINGS, in fortification, denote the longer fides of horn-works, crown-works, tenailles, and the like outworks; including the ramparts, and parapets, with which they are bounded on the right and left, from their gorge to their front.

Thefe wings, or fides, are capable of being flanked, either with the body of the place, if they ftand not too far diftant; or with certain redoubts; or with a traverfe made in their ditch.

St. Michael's WING, is the name of a military order in Portugal, inftituted according to the jefuit Mendo, in 1165; or, according to di Michieli, in his Teforo Militar de Cavalleria, in 1171. Its inftitutor was Alphonfus Henry I. king of Portugal; and the occafion was a victory gained by him over the king of Sevil, and his Saracens; for which he thought himfelf beholden to St. Michael, whom he had chofe for his patron in the war againft the infidels.

The banner they bore was a wing refembling that of the arch-angel, of a purple colour, encompaffed with rays of gold. Their rule was that of St. Benedict; the vow they made was to defend the Chriftian religion, and the borders of the kingdom, and to protect orphans. Their motto, Quis ut Deus.

WINGED, in botany, a term applied to fuch ftems of plants as are furnifhed, all their length, with a fort of membranous leaves.

Several kinds of thiftles have winged ftalks, and branches.

WINGED-LEAVES, in botany, are thofe which are compofed of feveral folioli, or little leaves, ranged on each fide the common foot-ftalk like wings; but as thefe are difpofed in different forms, fo they have different appellations. See PINNATED *Leaves*.

WINGED-SEEDS, are thofe which are furnifhed with down or hairs, by the help of which they are buoyed up in the air, and carried a confiderable diftance; fuch are thofe of the dandelion, fow-thiftle, &c.

WINGED, in heraldry, is applied to a bird, when its wings are of a different colour, or metal, from the body.

Winged is alfo applied to any thing reprefented with wings, though contrary to its nature; as a winged, or flying hart, &c.

WINNOW, fignifies to fan, or feparate corn from the chaff by wind.

WINTER, one of the four feafons or quarters of the year.

Winter commences on the day when the fun's diftance from the zenith of the place is the greateft, and ends on the day when its diftance is at a mean between the greateft and leaft.

Notwith-

Notwithſtanding the coldneſs of this ſeaſon, it is proved, in aſtronomy, that the ſun is really nearer to the earth in winter than in ſummer.

Under the equator, the winter, as well as the other ſeaſons, return twice every year; but all other places have only one winter in the year; which, in the northern hemiſphere, begins when the ſun is in the tropick of Capricorn; and in the ſouthern hemiſphere, when in the tropick of Cancer: ſo that all places in the ſame hemiſphere have their winter at the ſame time.

WINTER, among printers, that part of the printing-preſs ſerving to ſuſtain the carriage, &c.

WINTER'S BARK, *Cortex Winteranus*, in botany, a name given to the bark of the white or wild cinnamon tree.

The winter's bark is a thick and firm bark, though we have a different thing ſometimes under its name: it comes to us rolled up in the manner of the common cinnamon, into a kind of tubes or pipes; but they are uſually thicker, and always ſhorter than the fine tubes of cinnamon. It is externally of a greyiſh colour, and of a rediſh brown within; it is properly indeed a double bark, the outer and inner of the ſame tree, not the inner bark alone, ſeparated from the other, as the cinnamon and caſſia are. The outer rind is of an uneven ſurface and of a looſe texture, very brittle, and eaſily powdered. The inner bark, which has the principal virtue, is hard, and of a duſky rediſh brown. The outer one is often cracked and open in ſeveral places, the inner one never in any. It is of an extremely fragrant and aromatick ſmell, and of a ſharp, pungent, and aromatick taſte, much hotter than cinnamon in the mouth, and leaving a more laſting flavour on it.

It is to be choſen in pieces not too large, with the inner or brown part ſound and firm, and of a very ſharp taſte. It is apt to be worm-eaten; but in that caſe it is wholly to be rejected, as having loſt the far greater part of its virtue.

The cortex winteranus was wholly unknown to the ancients; the diſcovery of it among us is owing to captain Winter, who, in the year 1567, going as far as the ſtraights of Magellan with Sir Francis Drake, found this bark on that coaſt, and bringing a large quantity of it with him in his return to England, it became uſed in medicine, and was ever after called by his name. It is not, however, peculiar to the place he found it in, but is frequent in many parts of America.

The virtues of this bark were diſcovered by the Engliſh ſailors on board captain Winter's ſhip; they firſt uſed it by way of ſpice to their foods, and afterwards for the ſcurvy. It is alſo good in palſies and rheumatiſms; and a decoction of the leaves is good, by way of fomentation, for the parts externally affected by the ſcurvy. The Engliſh ſailors made it famous for its virtues againſt the poiſon of a certain fiſh, common about the Magellanick ſea, which they called the ſea-lion: they eat the fleſh of this fiſh, and fell into many illneſſes by it; among which was one attended with a peeling off the ſkin of their whole bodies, not without exceſſive pain; this they remedied by the cortex Winteranus: but by the accounts we have of the effects of eating this fiſh, as it is called, they were rather ſymptoms of an inveterate ſcurvy, and, therefore, it is no wonder this bark did them great ſervice.

WINTER-QUARTERS. See WINTER-QUARTERS.

WINTER-RIG, among huſbandmen, ſignifies to fallow or till the land in winter.

WINTER-SOLSTICE. See SOLSTICE.

WIRE, a piece of metal drawn through the hole of an iron into a thread, of a fineneſs anſwerable to the hole it paſſed through.

Wires are frequently drawn ſo fine, as to be wrought along with other threads of ſilk, wool, flax, &c.

The metals moſt commonly drawn into wire, are gold, ſilver, copper, and iron. Gold wire is made of cylindrical ingots of ſilver, covered over with a ſkin of gold, and thus drawn ſucceſſively through a vaſt number of holes, each ſmaller and ſmaller, till at laſt it is brought to a fineneſs exceeding that of a hair. That admirable ductility which makes one of the diſtinguiſhing characters of gold, is no where more conſpicuous than in this gilt wire. A cylinder of forty-eight ounces of ſilver, covered with a coat of gold, only weighing one ounce, as Dr. Halley informs us, is uſually drawn into a wire, two yards of which weigh no more than one grain; whence ninety-eight yards of the wire weigh no more than forty-nine grains, and one ſingle grain of gold covers the ninety-eight yards; ſo that the thouſandth part of a grain is above one-eighth of an inch long. The ſame author, computing the thickneſs of the ſkin of gold, found it to be $\frac{1}{1134500}$ part of an inch. Yet ſo perfectly does it cover the ſilver, that even a microſcope does not diſcover any appearance of the ſilver underneath. M. Rohault likewiſe obſerves, that a like cylinder of ſilver, covered with gold, two feet eight inches long, and two inches nine lines in circumference, is drawn into a wire 307200 feet long, i. e. into 115200 times its former length. Mr. Boyle relates, that eight grains of gold, covering a cylinder of ſilver, is commonly drawn into a wire 13000 feet long. See GOLD and DUCTILITY.

Silver wire is the ſame with gold wire, except that the latter is gilt, or covered with gold, and the other is not.

There are alſo counterfeit gold and ſilver wires; the firſt made of a cylinder of copper, ſilvered over, and then covered with gold; and the ſecond of a like cylinder of copper, ſilvered over, and drawn through the iron, after the ſame manner as gold and ſilver wire.

Braſs-wire is drawn after the ſame manner as the former. Of this there are divers ſizes, ſuited to the different kinds of works. The fineſt is uſed for the ſtrings of muſical inſtruments, as ſpinnets, harpſichords, manichords, &c. See SPINNET, &c.

The pin-makers, likewiſe, uſe vaſt quantities of braſs-wire, to make their pins of. Iron-wire is drawn of various ſizes, from half an inch to one-tenth of an inch diameter.

The firſt iron that runs from the ſtone, when melting, being the ſofteſt and tougheſt, is preſerved to make wire of. Iron-wire is made from ſmall bars of iron called eſleom-iron, which are firſt drawn out to a greater length, and to about the thickneſs of one's little finger, at a furnace, with a hammer gently moved by water. Theſe thinner pieces are bored round, and put into a furnace to aneal for twelve hours. A pretty ſtrong fire is uſed for this operation. After this they are laid under water for three or four months, the longer the better; then they are delivered to the workmen, called rippers, who draw them into wires through two or three holes. After this they aneal them again for ſix hours, and water them a ſecond time for about a week, and they are then delivered again to the rippers, who draw them into wire of the thickneſs of a large packthread. They are then anealed a third time, and then watered for a week longer, and delivered to the ſmall wire-drawers, called over-houſe-men.

In the mill where this work is performed, there are ſeveral barrels hooped with iron, which have two hoops on their upper ſides, on each whereof hang two links which ſtand acroſs, and are faſtened to the two ends of the tongs, which catch hold of the wire, and draw it through the hole. The axis on which the barrel moves does not run through the centre, but is placed on one ſide, which is that on which the hooks are placed; and underneath there is faſtened to the barrel a ſpoke of wood, which they call a ſwingle, which is drawn back a good way by the cogs in the axis of the wheel, and draws back the barrel, which falls to again by its own weight. The tongs hanging on the hooks of the barrel, are by the workmen faſtened to the end of the wire, and by the force of the wheel, the hooks being pulled back, draw the wire through the holes. The plate in which the holes are, is iron on the outſide, and ſteel on the inſide; and the wire is anointed with train-oil, to make it run the eaſier.

WIRE-MILL, a water-mill conſtructed in a particular manner for drawing wire.

We have given four figures of this curious and uſeful machine on *Plate* LXXIX.

The water-wheel of this mill has two motions, directly contrary to each other, occaſioned by the water's being turned alternately on each ſide of the wheel; by which means the tongs which lay hold of the wire are ſhifted, and a length of wire equal to the circumference of the drawing-wheel is finiſhed at each turn of the water-wheel.

Fig. 1. Is a plan of the whole machine. A, A, a large

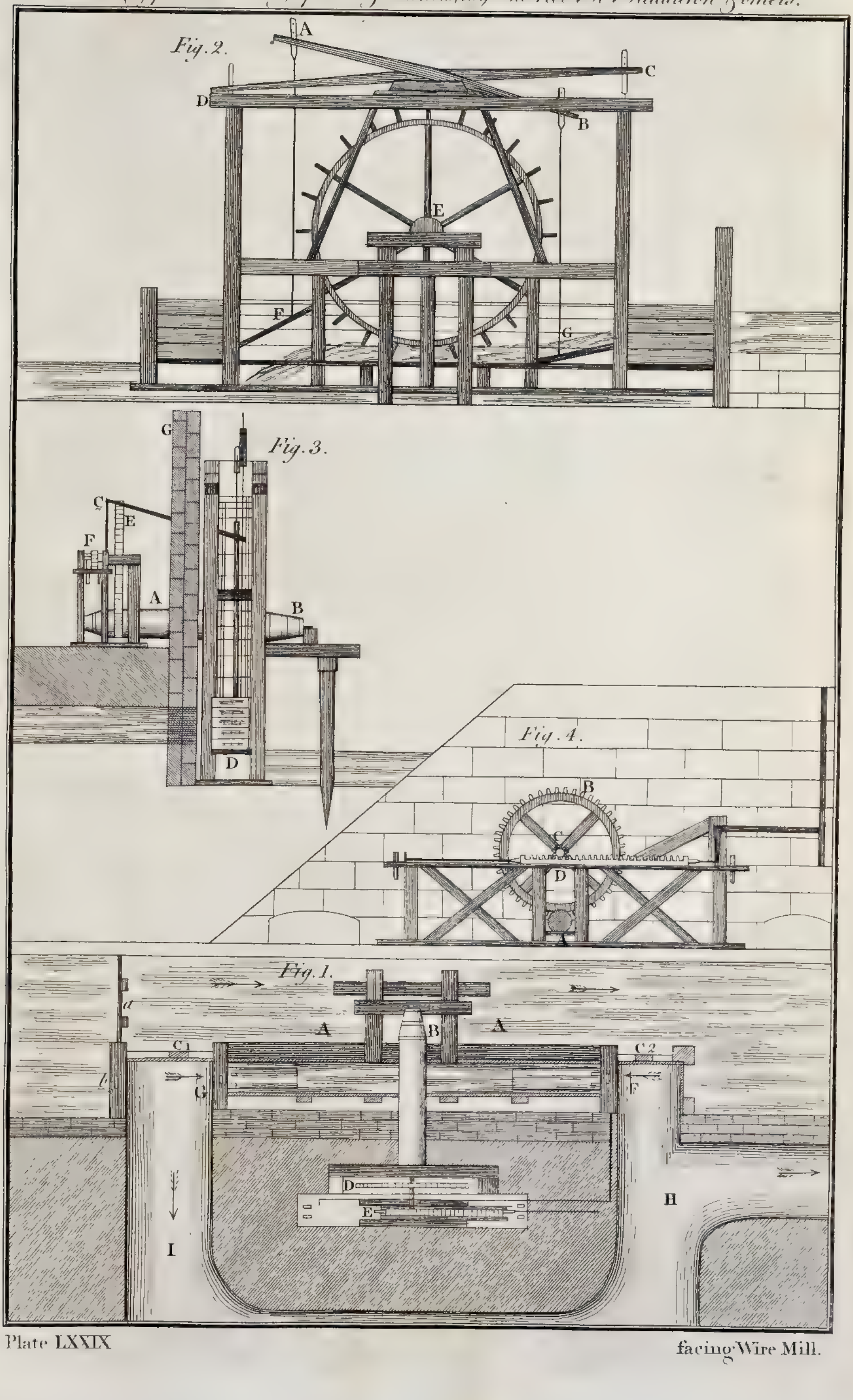

Plate LXXIX

facing Wire Mill.

large river, on the banks of which the mill is erected. B, the axis of the water-wheel. C 1, C 2, two penstocks, which let the water out of the river, in order to work the mill. D, the water-wheel. E, the rack, which moves forward and backward with the alternate motion of the water-wheel. F, G, two penstocks, which let the water upon the wheel alternately, they being successively drawn up. The darts shew the course of the stream. H, I, two channels which carry off the back-water. *a*, a lock across the river, for raising the water. *b*, a penstock, for carrying off the waste-water.

Fig. 2. Is a section of the apparatus for drawing the penstocks alternately. A, B, is the lever by which the two penstocks, F, G, are drawn. In the position represented in the figure, the penstock F is drawn up, and G is shut. The position C, D, shews the opposite motion; the penstock G being just beginning to be drawn, and that at F almost closed. E is the water-wheel.

Fig. 3. Is a front view of the water-wheel, with one of the penstocks, &c. A, B, the axis of the water-wheel. C, the lever of the penstock. D, the penstock, E, a cog-wheel turned by a trundle-head, on the shaft of the water-wheel. F, a toothed wheel on the shaft of the cog-wheel E.

Fig. 4. A view of the rack, and the manner how it is moved forwards and backwards, by the vibratory motion of the water-wheel. A, part of the trundle-head on the shaft of the water-wheel. B, the cog-wheel. C, another cog-wheel on the shaft of B. D, the rack which the toothed wheel C moves forwards and backwards.

In order to work this mill, two men are posited, one at the end A of the lever A B (*fig.* 2.) and the other at the end B; and by pulling down each successively, the water falls on each side of the wheel alternately, and consequently causes it to move in a vibratory manner; and the rack, to which the tongs are fixed, to move forwards and backwards.

WISDOM, *Sapience*, usually denotes a higher and more refined knowledge of things, immediately presented to the mind, as it were, by intuition, without the assistance of ratiocination. See UNDERSTANDING, REASON, KNOWLEDGE, &c.

In this sense, wisdom may be said to be a faculty of the mind, or at least a modification and habit thereof. See FACULTY, MODIFICATION, HABIT, &c.

Sometimes the word is more immediately used in a moral sense, for what we call prudence, or discretion; which consists in the soundness of the judgment, and a conduct answerable thereto.

The school-divines, sometimes restrain wisdom to the knowledge of the more sublime and remote objects, as that of God, &c. In which sense, theology is properly said to be wisdom.

The Latin word for wisdom, is *sapientia*, which literally expresses the sense of tasting; to which wisdom is supposed to have some conformity. The sight, and other senses, only represent to us the surface of things: taste goes deeper, penetrates into the substances; so that what, e. gr. to the feeling seemed cold, to the taste shall be found hot: so wisdom, arising from a deep attention to our ideas, goes further, and frequently judges otherwise than the common apprehensions of men would reach to.

WIST, WISTA, a quantity, or measure of land among our Saxon ancestors; of different dimensions, in different places. In the Monasticon, it is said to be half a hide, or sixty acres: in an old chronicle of the monastery of Battle, it is said to be forty-eight acres.

WIT, a faculty of the mind, consisting, according to Mr. Locke, in the assembling, and putting together of those ideas with quickness and variety, wherein can be found any resemblance or congruity; whereby to make up pleasant pictures, and agreeable visions to the phantasy.

This faculty, the same great author observes, is just the contrary of judgment, which consists in the separating carefully from one another, such ideas wherein can be found the least difference, thereby to avoid being misled by similitude, and, by affinity, to take one thing for another.

It is the metaphor and allusion wherein, for the most part, lies the entertainment and pleasantry of wit; which strikes so lively on the fancy, and is therefore so acceptable to all people, because its beauty appears at first sight, and there is required no labour of thought, to examine what truth or reason there is in it. The mind, without looking any further, rests satisfied with the agreeableness of the picture, and the gaiety of the imagination; and it is a kind of affront to go about to examine it by the severe rules of truth, or reason. Whence it should seem, that wit consists in something that is not perfectly conformable to them. *Essay on Human Underst.* Lib. I. cap. 11.

WIT is also an appellation, given to persons possessed of the faculty called wit, esprit.

A French author, who, in 1695, published a treatise of wit, du bel esprit, lays down four characteristicks thereof.

1°. A man, who, with an open air, and easy motions, affects those he converses withal agreeably; and on any subject that presents itself, advances new thoughts, and adorns them with a spritely turn; is, all the world over, a wit.

2°. Another, who, less solicitous about the choice and delicacy of his sentiments, knows how to make himself valued by I know not what elevation of discourse; who draws a deal of attention, and shews a deal of vivacity in his speaking, and readiness in his answers; is likewise acknowledged a wit.

3°. A third, who takes less care about thinking, than about speaking well; who affects fine words, though perhaps low and poor in matter; who pleases by an easy pronunciation, and a certain tone of voice, is placed in the same rank.

4°. Another, whose chief aim is not to make himself esteemed, so much as to raise mirth and laughter: who jokes pertinently, rallies pleasantly, and finds something to amuse himself withal in every petty subject; is likewise allowed a wit.

Yet, it may be observed, that in all these cases, there is nothing of real wit, as above defined; but the whole is imagination, or memory at most: nay the whole is no more than temperament may give.

A true wit must have a just faculty of discernment; must have, at the same time, both a deal of energy, and of delicacy in his sentiments; his imagination must be noble, and withal happy and agreeable; his expressions polite and well turned: without any thing of parade or vanity in his discourse, or his carriage. It is not at all essential to a wit, to be ever hunting after the brilliant; still studying fine thoughts, and affecting to say nothing but what may strike and surprize.

This is a fault very frequent in dramatick persons: the duke of Buckingham rallies it very justly:

'What is that thing which we sheer wit do call?
'Tis when the wit of some great writer shall
'So overflow, that is, be none at all:
'That even his fools speak sense.'

Humour, say our criticks, is the genuine wit of comedy.

WITCHCRAFT, the crime of sorcery, especially in women.

There may, perhaps, be some foundation for what we call fascination, and witchcraft. We have infinite instances, and histories to this purpose; which it were not fair to set aside, merely because they are not reconcileable to our philosophy: but, as it happens, there seems to be something in philosophy to countenance them.

All living things, we know, emit effluvia, both by the breath, and the pores of the skin. All bodies, therefore within the sphere of their perspiratory, or expiratory effluvia, will be affected by them; and that, in this or another manner, according to the quality of the effluvia; and in this or that degree, according to the disposition of the emittent, and recipient parts.

Thus far is inconteftable; nor need we produce instances of animals exhaling sweet, or stinking smells; or of infectious diseases conveyed by effluvia, &c. in confirmation thereof.

Now, of all parts of an animal body, the eye, we know, is the quickest. It moves with the greatest celerity, and in all the variety of directions. Again, its coats and humours are permeable as any other part of the body, (witness the rays of light it so copiously receives.) The eye, therefore, no doubt, emits its effluvia like the other parts,

parts. The fine humours of the eye muſt be continually exhaling. The heat of the pervading rays will rarefy and attenuate them: and that, with the ſubtile juice, or ſpirit of the neighbouring optick nerve, ſupplied, in great abundance, by the vicinity of the brain, muſt make a fund of volatile matter to be diſpenſed, and, as it were, determined by the eye.

Here, then, we have both the dart, and the hand to fling it. The one furniſhed with all the force and vehemence, and the other with all the ſharpneſs and activity, one would require. No wonder if their effects be great!

Do but conceive the eye as a fling, capable of the ſwifteſt and intenſeſt motions and vibrations: and, again, as communicating with a ſource of ſuch matter, as the nervous juice elaborated in the brain; a matter ſo ſubtile and penetrating, that it is ſuppoſed to fly inſtantaneouſly through the ſolid capillaments of the nerves; and ſo active and forcible, that it diſtends and convulſes the muſcles, and diſtorts the limbs, and alters the whole habitude of the body, giving motion and action to a maſs of inert, inactive matter. A projectile of ſuch a nature, flung by ſuch an engine as the eye, muſt have an effect wherever it ſtrikes: and the effect will be limited and modified by the circumſtances of diſtance, the impetus of the eye, the quality, ſubtility, acrimony, &c. of the juices, and the delicacy, coarſeneſs, &c. of the object it falls on.

This theory, we are of opinion, may account for ſome of the phænomena of witchcraft, particularly of that branch called faſcination. It is certain the eye has always been eſteemed the chief ſeat, or rather organ of witchcraft; though, by moſt, without knowing why, or wherefore: the effect was apparently owing to the eye; but, how was not dreamed of. Thus, the phraſe, to have an evil eye, imports as much as to be a witch. And hence Virgil—Neſcio quis teneros oculus mihi faſcinat agnos. Again, old, bilious perſons, are thoſe moſt frequently ſuppoſed to have the faculty; the nervous juice in them being depraved, and irritated by a vicious habitude of body; and ſo rendered more penetrating, and malignant. And young perſons, chiefly children and girls, are moſt affected by it; by reaſon their pores are patent, their juices incoherent, and their fibres delicate, and ſuſceptible. Accordingly, the witchcraft mentioned by Virgil, only reaches to the tender lambs. Laſtly, the faculty is only exerciſed when the perſon is diſpleaſed, provoked, irritated, &c. It requiring ſome extraordinary ſtreſs, and emotion of mind, to dart a proper quantity of the effluvia, with a ſufficient impetus, to produce the effect at a diſtance.

That the eye has ſome very conſiderable powers, is paſt diſpute. The antient naturaliſts aſſure us, that the baſiliſk, and opoblepa, kill other animals merely by ſtaring at them. If this fail of credit; a late author aſſure us to have ſeen a mouſe running round a large toad, which ſtood looking earneſtly at it, its mouth open: ſtill the mouſe made leſs and leſs circles about it; crying all the while, as if compelled thereto; and, at laſt, with a deal of ſeeming reluctance, ran into the gaping mouth, and was ſtraight ſwallowed.

Who has not obſerved a ſetting-dog; and the effect of its eye on the partridge? The poor bird, when once its eyes meet thoſe of the dog, ſtands as if confounded, regardleſs of itſelf, and eaſily lets the net be drawn over it. We remember to have read of ſquirrels ſtupified, and overcome by a dog's ſtaring hard at them, and thus made to drop out of the trees into his mouth.

That man is not ſecure from the like affections, is matter of eaſy obſervation. Few people but have, again and again, felt the effects of an angry, a fierce, a commanding, a diſdainful, a laſcivious, an intreating eye, &c. Theſe effects, no doubt, are owing to the different ejaculations from the eye; and are a degree of witchcraft.

WITENA-MOT, or WITENA-GEMOT, among our Saxon anceſtors, was a term which literally ſignified the aſſembly of the wiſe men, and was applied to the great council of the nation, of latter days called the parliament.

WITHERNAM, in law, a repriſal, or taking of other goods or cattle, in lieu of thoſe unjuſtly taken and eſloined, or otherwiſe with-holden.

Where goods are taken by colour of diſtreſs, and driven to an hold, or out of the county; ſo that the ſheriff cannot, upon replevin, make deliverance thereof to the party diſtrained: in this caſe the writ of withernam, or de vetito namio, is iſſued, directed to the ſheriff, for the taking as many of the party's beaſts, as he did thus unlawfully reſtrain; or as much goods of his, till he has made deliverance of the firſt diſtreſs.

WITHERS of a horſe, the juncture of the ſhoulder-bones at the bottom of the neck and main, towards the upper part of the ſhoulder.

WITNESS, *Teſtis*, a perſon who certifies, or aſſerts the truth of any fact.

Among the Romans, it was a cuſtom to pull or pinch the ears of witneſſes preſent at any tranſaction; that they might remember it when they were called to give in their teſtimony. Two eye-witneſſes, or de viſu, not ſuſpected, are deemed a concluſive proof.

Falſe witneſſes, ſuborners of witneſſes, &c. in England, are puniſhed with the pillory; in ſeveral other countries, with death.

In a ſynod at Rome, under Conſtantine, in the year 320, it was decreed, that there ſhould be ſeventy-two witneſſes heard, to condemn a biſhop; which was called libra teſtium, a pound of witneſſes. Accordingly there were ſeventy-two witneſſes heard againſt Pope Marcellinus; who, ſays the hiſtorian, erant electi libra occidua.

Antiently there were ſynodial witneſſes, teſtes ſynodales, in each pariſh, choſe by the biſhop, to enquire into the hereſies, and other crimes of the pariſhioners; and to make oath thereof on the relicks of the ſaints.

WOAD, *Guadum*, or *Glaſtum*, a drug uſed by the dyers, to give a blue colour. See ISATIS.

It ariſes from a ſeed, ſown annually in the ſpring; which puts forth a plant called glaſtum ſativum, whoſe leaves reſemble thoſe of ribwort-plantain. They have uſually three, four, or five crops of leaves every year; but only the two or three firſt are of any value; whereof the firſt is beſt, and the reſt in their order.

When the leaves are ripe, they gather them; and letting them lie ſome time, put them under the wheel to bruiſe or grind them: after which, they are laid eight or ten days in piles or heaps; and at laſt reduced into a kind of balls, which are laid in the ſhade, or hurdles, to dry.

This done, they break or grind them to powder; and when ground, ſpread it on a floor, and water it, which they call couching.

Here they let it ſmoke and heat, till, by torrifying it every day, it becomes quite dry, which they call ſilvering. A week after which, it is in a condition to be uſed in dying. The ancient Britons uſed to dye their bodies herewith; and ſome hold, that it was from this plant glaſs took its denomination; though others derive both glaſs, and glaſtum, from the Britiſh glaſs, which, to this day, denotes a blue colour.

A woad blue, is a very deep blue, almoſt black; and is the baſe of ſo many ſorts of colours, that the dyers have a ſcale, whereby they compoſe the divers caſts or degrees of woad, from the brighteſt to the deepeſt.

WOLD, ſignifies a plain down, or open champaign ground, hilly and void of wood.

WOLD, or WELD, among dyers. See WELD.

WOLF, *Lupus*, in zoology, a very large and fierce animal, being equal to the biggeſt maſtiff in ſize, and having much of the general appearance of that creature.

WOLF'S-BANE, in botany, the Engliſh name for the aconitum. See ACONITE.

WOLFESHEAD, or WULVERSHEAD, *Caput lupinum*, denoted the condition of thoſe out-lawed for criminal matters in the Saxons time, and not yielding themſelves to juſtice. For if they could have been taken alive, they muſt have been brought to the king; and if they, for fear of being apprehended, did defend themſelves, they might be ſlain, and their heads brought to the king; for their head was no more to be accounted of than a wolf's head. *L L. Edw.* in *Lamb.* fol. 127. and *Bract.* Lib. III. Tract. 2. cap. 11.

WOLVES TEETH, of an horſe, are over-grown grinders, the points of which being higher than the reſt, prick his tongue and gums in feeding, ſo as to hinder his chewing. They are ſeldom met with in any beſides young horſes; but if they be not daily worn by chewing, they will grow up even to pierce the roof of the mouth.

WOMAN, FOEMINA, *Mulier*, the female of man.

St. Auguftin calls women the devout fex: at leaft this is the common opinion; though others rather think, that in the prayer ufually attributed to that father, and ftill rehearfed in the Romifh church to the holy virgin, the words intercede pro devoto fœmineo fexu, are to be underftood of women devoted, or confecrated to God in religious houfes; which had been fufficiently expreffed by the words, ora pro populo, interveni pro clero.

It is a popular tradition among the Mahometans, which obtains to this day, that women fhall not enter Paradife.

An anonymous author, about the clofe of the fixteenth century, publifhed a little Latin differtation, to prove that women are not men; that is, are not reafonable creatures: differtatio perjucunda qua anonymus probare nititur mulieres homines non effe. He alfo endeavours to prove, what naturally follows from this principle, viz. that women fhall not be faved; that there is no future life, or happinefs for them.

His proofs, he fays, are all either taken from or founded on fcripture. Though, after all, his aim is not fo much to degrade women to the condition of brutes; as to ridicule the principle or method of many Proteftants, who, in points of controverfy, admit of no proofs or confiderations, but what are taken from fcripture alone. This appears from the conclufion of the work. Probavi, opinor, invictiffimis SS. Literarum teftimoniis, mulierem non effe hominem, nec eam falvari: quod fi non effeci, oftendi tamen univerfo mundo quo modo hujus temporis hæretici, & præfertim Anabaptiftæ, facrum foleant explicare fcripturam, & qua utantur methodo ad ftabilienda fua execranda dogmata.

Yet, Simon Gediccus, a Lutheran divine, wrote a ferious confutation of this piece in 1595; wherein his abfurd reafonings and vile perverfion of the fcriptures are fufficiently expofed.

The ancient Marcionites allowed their women to baptize; as we are affured by S. Epiphanius, *Hær.* 42. c. 4. The Montanifts admitted women to the priefthood, and even the epifcopate. Epiph. *Hær.* 49. c. 2. The modern Quakers alfo permit their women to preach and prophefy, on an equal footing with the men.

It is a point much controverted, how far learning and ftudy become the fex? Erafmus handles the queftion at large in one of his letters to Budæus. Lud. Vives, in his *Inftitutio Fœminæ Chriftianæ*, has a chapter exprefs on the fame fubject. Madam Schurman, a German lady, has gone beyond them both, in a treatife on this problem; Num Fœminæ Chriftianæ conveniat ftudium literarum?

Several of the women remarkable for learning, have been alfo diftinguifhed for their want of conduct. The reafon, no doubt, lay in this; that their firft ftudies lying in books of gallantry and intrigue, the imagination was early turned that way, and the memory filled with a fort of ideas, which a favourable difpofition, and age, adopted too eafily, and improved too faft. It is not that ftudy in itfelf has any natural tendency to produce fuch effects; rather the contrary: the clofe abftracted refearches of metaphyficks, logicks, mathematicks, phyficks, criticifm, &c. no doubt, will be one of the fureft means to fecure and eftablifh the virtue of continency in a woman.

A woman, in England, as foon as fhe is married, with all her moveables, is wholly in poteftate viri, at the will and difpofal of her hufband.

WOMB, *Uterus*. See UTERUS.

WONDER. The feven wonders of the world, as they are popularly called, were the Egyptian pyramids; the maufoleum, erected by Artemifia; the temple of Diana, at Ephefus; the walls and hanging gardens of the city of Babylon; the coloffus, or brazen image of the fun at Rhodes; the ftatue of Jupiter Olympius; and the pharos, or watch-tower of Ptolemy Philadelphus.

WOOD, *Lignum*, a folid fubftance, whereof the trunks and branches of trees confift.

The wood is all that part of a tree included between the bark and the pith.

Mortimer obferves, that all kinds of wood are to be preferved from the worm, and from many other occafions of decay, by oily fubftances, particularly the effential oils of vegetables. Oil of fpike is excellent; and oil of juniper, turpentine, or any other of this kind, will ferve the purpofe; thefe will preferve tables, inftruments, &c. from being eaten to pieces by thefe vermin; and linfeed-oil will ferve, in many cafes, to the fame purpofe; probably nut-oil will do alfo, and this is a fweeter oil, and a better varnifh for wood.

Cutting in WOOD, is ufed for various purpofes; as for initial and figured letters, head and tail-pieces of books, and even for fchemes, mathematical and other figures, to fave the expence of engraving on copper; alfo for prints, and ftamps for papers, callicoes, linens, &c.

The invention of cutting in wood, as well as that in copper, is afcribed to a goldfmith of Florence; but Albert Durer and Lucas brought both thefe arts to perfection.

About two hundred years ago, the art of cutting in wood was carried to a very great pitch, and might even vie, for beauty and juftnefs, with that of engraving on copper: at prefent it is much neglected, the application of artifts being wholly employed on copper, as the more eafy and promifing province: not but that wooden cuts have the advantage of thofe in copper in many refpects, chiefly for figures and devices in books; as being printed at the fame time, and in the fame prefs with the letters: whereas for the other, there is required a particular and feparate impreffion.

The cutters in wood begin with preparing a plank, or block, of the fize and thicknefs required, and very even and fmooth on the fide to be cut: for this they ufually take pear-tree, or box; but the latter is beft, as being clofeft, and leaft liable to be worm-eaten. On this block they draw the defign with a pen or pencil, exactly as they would have it printed; or they faften the defign drawn on paper upon the block with pafte and a little vinegar, the ftrokes or lines turned towards the wood. As foon as the paper is dry, they wafh it gently with a fponge dipped in water, and then take it off by little and little, rubbing it firft with the tip of the finger, till nothing is left on the block but the ftrokes of ink that form the defign, which mark out what part of the block is to be fpared or left ftanding. The reft they cut off very carefully with the points of very fharp knives, chiffels, or gravers, according to the bignefs or delicacy of the work.

WOOD, *Silva*, in geography, a multitude of trees extended over a large continued tract of land, and propagated without culture. The generality of woods only confift of trees of one kind.

The ancient Saxons had fuch a veneration for woods, that they made them fanctuaries.

The burning of woods, or under-wood, is declared to be felony; alfo thofe perfons that malicioufly cut or fpoil timber-trees, fruit-trees, &c. fhall be fent to the houfe of correction, there to be kept three months, and whipt once a month.

WOOD *and* WOOD, in the fea-language, is when two pieces of timber are fo let into each other, that the wood of the one joins clofe to the other.

WOOD-CORN, is a certain quantity of oats, or other grain, anciently given by cuftomary tenants to their lord, for the liberty to pick up dead or broken wood.

WOOD-GELD, WOODGELDUM, in our ancient cuftoms, the gathering, or cutting of wood within the foreft. Or, it may denote the money paid for the fame, to the forefters.

Sometimes it alfo feems to fignify an immunity from this payment, by the king's grant. Crompton fays exprefly, it fignifies to be free from the payment of money for taking of wood in a foreft.

WOOD-HAY, an ancient cuftom at Exeter; whereby a log out of every feam of wood brought over Ex bridge, is taken towards the reparation of that bridge. *Antiq. of Exeter*.

WOOD-MOTE, the ancient name of that foreft-court, now called the court of attachment.

WOOD-PLEA-COURT, is a court held twice a year in the foreft of Clun in Shropfhire, for determining all matters relating to wood, and the feeding of cattle there. Perhaps it was originally the fame with wood-mote-court.

WOODWARD, an officer of the foreft, whofe function it is to look after the woods, and obferve any offence

offences either in vert or in venison, committed within his charge, and to prevent the same; and in case any deer are found killed, or hurt, to inform the verderer thereof, and to present them at the next court of the forest. See FOREST.

WOOF, among manufacturers, the threads which the weavers shoot a-cross, with an instrument called the shuttle, between the threads of the warp, to form the web.

The woof is of different matter, according to the piece to be wrought. In taffety, both woof and warp are silk. In mohairs, the woof is usually wool, and the warp silk. In sattins, the warp is frequently flax, and the woof silk.

WOOL, *Lana*, the hair, or covering of sheep; which, washed, shorn, dressed, combed, spun, wove, &c. makes divers kinds of stuffs, cloths, &c. for apparel, furniture, &c.

While the wool remains in the state it was first shorn off the sheep's back, and not sorted into its different kinds, it is called fleece.

Each fleece consists of wool of divers qualities, and degrees of fineness, which the dealers therein take care to separate.

The French and English usually separate each fleece into three sorts; viz. 1°. Mother-wool, which is that of the back and neck. 2°. The wool of the tails and legs. 3°. That of the breast, and under the belly.

The Spaniards make the like division into three sorts, which they call prime, second, and third; and, for the greater ease, denote each bale or pack with a capital letter, denoting the sort. If the triage, or separation be well made, in fifteen bales there will be twelve marked R; that is, refine, or prime; two marked F, for fine, or second; and one S, for thirds.

The wools most esteemed are the English, chiefly those about Leominster, Cotswold, and the Isle of White; the Spanish, principally those about Segovia; and the French, about Berry: which last are said to have this peculiar property, that they will knot or bind with any other sort; whereas the rest will only knot with their own kind.

Among the ancients, the wools of Attica, Megara, Laodicea, Apulia, and especially those of Tarentum, Parma, and Altino, were the most valued. Columella sets the two last even above that of Tarentum, Lib. VII. c. 2. And Varro assures us, the people there used to clothe their sheep with skins, to secure the wool from being damaged. *De Re Rust.* Lib. II. c. 2.

Tavernier affirms, that the wools in Asia are incomparably finer than those of Europe; and that there is no doubt, but that wool was the golden fleece sought for at Colchis.

The art of preparing and working wool, is attributed, by the ancients, to Minerva; who, accordingly, is made the genius and protectress thereof.

English WOOL. The wools of England have always been in the highest repute; and that more abroad than at home. Some we have, which, manufactured by our own clothiers, Chamberlayne observes, does, both for softness and firmness, vie with the choicest silks. Spanish wools, we know, bear a great price among us but it is certain, much the greatest part of that, which when manufactured, our clothiers, &c. call Spanish cloth, grows in England. Add, that the French can make no good cloth of their own wool, without, at least, one third of English wool mixed with it. It is allowed, the goodness of the Spanish wools is owing to a few English sheep sent over into Spain, as a present, by Henry II. of England; or, as others will have it, though we think mistakenly, by Edward IV. in 1465.

The fineness and plenty of our wools is owing, in some measure, to the sweet, short grass in many of our pastures and downs; though the advantage of our sheeps feeding on this grass all the year, without being obliged to be shut up in folds during the winter, or to secure them from wolves at other times, contributes not a little thereto.

The Scotch and Irish wools, are commonly sold abroad for English; and upon the same footing. But foreigners, skilled in those matters, find they come far short of it in fineness; though, in some markets, the Irish is even said to be preferred to the English.

The yearly produce of wool in England, is calculated by Dr. Davenant, and Mr. King, at two millions sterling.

Anciently, the principal commerce of the nation consisted in wool unmanufactured; which foreigners, especially the French, Dutch, and Flemish bought of us. Insomuch, that the customs of English wool exported in Edward the third's reign, amounted, at 50*s.* a pack, to 250000*l.* per annum. An immense sum in those days!

This excessive custom on the export of unmanufactured wool, set our people to the making it into cloth themselves. In which they succeeded so well, that towards the close of the sixteenth century, under the reign of queen Elizabeth, the exportation of any wool at all was absolutely prohibited; and this, upon pain of having the right hand struck off.

From that time, England has been exceedingly jealous of its wool. To prompt their vigilance, the judges, &c. in parliament, are seated on wool packs. Accordingly, scarce a parliament but has renewed, and reinforced the prohibition; particularly, about the middle of the seventeenth century, the exporting of wool was made a capital crime.

But all these precautions are ineffectual; the English themselves, particularly about the coasts of Sussex, making use of the long winter nights to waft over their wools to France: being sure of carrying them to a good market, they despise the penalty, with an intrepidity, that the rest of Europe are amazed at.

M. Colbert, a name the French manufactures and commerce are infinitely indebted to, had entertained a design of procuring some of our English sheep, and propagating them in France; hoping, that by chusing them, in the provinces of that kingdom, such pastures, and such a sky as they had in their own island, they might there be perpetuated; and France be no longer obliged precariously to depend on the clandestine supplies of wool from the English owlers. But the count de Cominges, then ambassador of France at the English court, laid the impossibility of having such an export of sheep, and the almost equal impossibility of keeping and making them multiply there, so strongly before him, that he abandoned the design.

Wool is reckoned by the sack, containing two weighs; the weigh, six tod and a half; the tod, two stone; the stone, two cloves; and the clove, seven pounds. Twelve sacks make a last, or 4368 pounds.

A sack of wool, or 364 pounds, is sufficient for four standard cloths, to render them true breadth, i. e. six quarters and a half; true weight, i. e. sixty pounds; and true length, i. e. twenty four yards.

WOOL, is also used for the soft hair growing on several wild beasts, the skins of which are distinguished by the name of furs.

Cotton-WOOL. See COTTON.

WOOL-DRIVERS, are those who buy wool of the sheep-owners in the country, and carry it on horseback to the clothiers, or market-towns, to sell it again.

WOOL-STAPLE, denotes a city or town where wool used to be sold.

WOOL-WINDERS, are persons employed in winding up fleeces of wool into bundles to be packed and sold by weight. Those are sworn to do it duly between the owner and the merchant.

WOOLLEN MANUFACTURE, includes the several sorts of commodities into which wool is wrought, as broad cloth, long and short kerseys, bays, serges, flannel, perpetuanas, says, stuffs, frize, penniftones, stockings, caps, rugs, &c.

Explanation of plate LXXX. *representing a Dyehouse for Woollen Goods, Hats, &c.*

Fig. 4. The beating-room, or the place where the materials are beat together. A, B, the basin in the table, where the goods are beaten.

Fig. 5. The apartment where the materials for making hats are bowed, or mixed well together, and the dust separated from them by means of a bow; with a workman employed in that part of the work.

A, the stick of the bow.

B, the groove of the bow-string.

C, the place where the hurdle or wicker-frame changes from a plane into a curve.

D, the guard fixed upon the bow-stick, where the workman fixes his hand.

E, the

The New Complete Dictionary of Arts & Sciences, By The Revd. Mr. Middleton, &c.

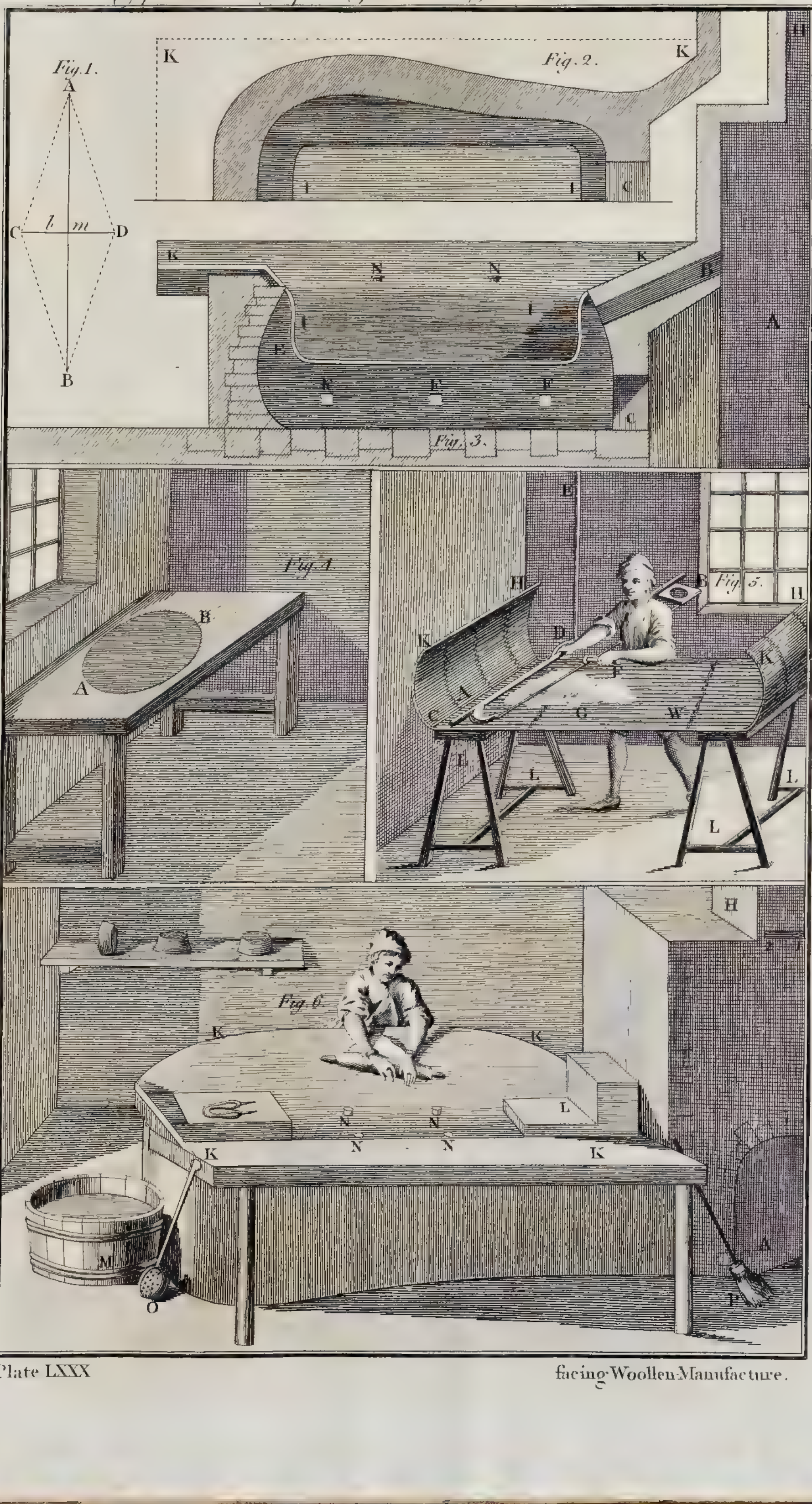

Plate LXXX

facing Woollen Manufacture.

E, the cord, by which the bow-ſtick is ſuſpended from the ceiling.

F, the notch-ſtick, by which the bow-ſtring is drawn.

G, the ſtuff, or materials expoſed to the action of the bow-ſtring.

H K, H K, the back of the hurdle.

L L, L L, the truſſles, which ſupport the hurdle.

W, the hurdle, or wicker-frame, on which the ſtuff is bowed, and through the interſtices of which the duſt and refuſe of the materials fall.

Fig. 6. A perſpective view of the furnace, where the goods are rolled and prepared for dying.

A, the mouth of the ſtove.

H, the ſhaft of the chimney.

1, 2, A regiſter or vent-hole in the chimney.

K K, K K, the benches of the furnace, on which the goods are rolled; with a workman rolling a piece of goods.

L, a little bench on which the ſtuff is laid.

M, a tub for holding the materials.

N, N, N, N, buttons of iron or wood to ſtop the rollers.

O, a ſkimmer.

P, a broom.

Fig. 1. Repreſents the vibrations of the bow-ſtring.

A B, the bow-ſtick.

A D, D B, A C, C B, the bow-ſtring drawn in oppoſite directions.

m b, the ſmaller vibrations.

Fig. 2. A plan of half the furnace:

C, the door of the furnace-hole.

I, I, the furnace of copper.

K, K, the bench of the furnace.

Fig. 3. A longitudinal ſection of the furnace.

A, the flue of the chimney.

B, a regiſter.

C, the door of the furnace.

E, the under part of the furnace.

F, F, F, bars that ſupport the bottom of the furnace.

H, the ſhaft of the chimney.

I, I, the furnace.

K, K, the bench of the furnace.

N, N, the buttons, either of iron or wood, that ſtop the roller.

WORD, in language, an articulate ſound, deſigned to repreſent ſome idea.

The port-royaliſts define words to be diſtinct articulate ſounds, agreed on by mankind to convey their thoughts and ſentiments by.

Word, in writing, is defined to be an aſſemblage of ſeveral letters forming one or more ſyllables, and expreſſing the name, quality, or manner of a thing.

Etymology and ſyntax being the two parts of grammar converſant about words, the firſt of theſe explains the nature and propriety of words, and the other treats of the right compoſition of words in diſcourſe.

The moſt remarkable thing in the pronouncing of words, is the accent, or the elevation of the voice, on ſome particular ſyllable of the word, which elevation is neceſſarily followed by a depreſſion of the voice.

Grammarians generally divide words into eight claſſes, called parts of ſpeech.

Words are again divided into primitives and derivatives, ſimple and compound, ſynonimous and equivocal.

With regard to their ſyllables, words are further divided into monoſyllables and polloſyllables.

The grammatical figures of words which occaſion changes in the form, &c. thereof, are proſtheſis, aphæreſis, diæreſis, metatheſis, and antitheſis.

The uſe of words, we have obſerved, is to ſerve as ſenſible ſigns of our ideas; and the ideas they ſtand in the mind of the perſon that ſpeaks, are their proper ſignifications.

Simple and primitive words have no natural connection with the things they ſignify, whence there is no rationale to be given of them; it is by mere arbitrary inſtitution and agreement of men, that they come to ſignify any thing. Certain words have no natural propriety or aptitude to expreſs certain thoughts more than others; were that the caſe, there could have been but one language. But in derivative and compound words, the caſe is ſomewhat different. In the forming of theſe, we ſee regard is had to agreement, relation, and analogy; thus moſt words that have the ſame ending, have one common and general way of denoting or ſignifying things; and thoſe compounded with the ſame prepoſitions have a ſimilar manner of expreſſing and ſignifying ſimilar ideas, in all the learned languages where they occur.

For the perfection of language, it is not enough, Mr. Locke obſerves, that ſounds can be made ſigns of ideas, unleſs theſe can be made uſe of ſo as to comprehend ſeveral particular things; for the multiplication of words would have perplexed their uſe, had every particular thing needed a diſtinct name to be ſignified by. To remedy this inconvenience, language had a further improvement in the uſe of general terms, whereby one word was made to mark a multitude of particular exiſtences; which advantageous uſe of ſounds was obtained by the difference of the ideas they were made ſigns of, thoſe names becoming general which are made to ſtand for general ideas, and thoſe remaining particular, where the ideas they are uſed for are particular.

It is obſervable, that the words which ſtand for actions and notions, quite removed from ſenſe, are borrowed from ſenſible ideas; as to imagine, apprehend, comprehend, underſtand, adhere, conceive, inſtil, diſguſt, diſturbance, tranquility, &c. which are all taken from the operations of things ſenſible, and applied to modes of thinking. Spirit, in its original ſignification, is no more than breath; angel, a meſſenger. By which we may gueſs what kind of notions they were, and whence derived, which filled the minds of the firſt beginners of languages; and how nature, even in the naming of things unawares, ſuggeſted to men the originals of all their knowledge: whilſt to give names that might make known to others any operations they felt in themſelves, or any other ideas that came not under the ſenſes, they were forced to borrow words from the ordinary and known ideas of ſenſation.

The ends of language, in our diſcourſe with others, are chiefly three; firſt, to make our thoughts or ideas known one to another. This we fail in, 1. When we uſe names without clear and diſtinct ideas in our mind. 2. When we apply received names to ideas, to which the common uſe of that language doth not apply them. 3. When we apply them unſteadily, making them ſtand now for one, and anon for another idea. Secondly, to make known our thoughts with as much eaſe and quickneſs as poſſible. This men fail in when they have complex ideas, without having diſtinct names for them, which may happen either through the defect of a language which has none, or the fault of the man who has not yet learned them. Thirdly, to convey the knowledge of things. This cannot be done but when our ideas agree to the reality of things. He that has names without ideas, wants meaning in his words, and ſpeaks only empty ſounds. He that has complex ideas without names for them, wants diſpatch in his expreſſion. He that uſes his words looſely, and unſteadily, will either not be minded, or not underſtood. He that applies names to ideas, different from the common uſe, wants propriety in his language, and ſpeaks gibberiſh; and he that has ideas of ſubſtances diſagreeing with the real exiſtence of things, ſo far, wants the materials of true knowledge.

WORD, or *Watch* WORD, in an army or garriſon, is ſome peculiar word or ſentence, by which the ſoldiers know and diſtinguiſh one another in the night, &c. and by which ſpies and deſigning perſons are diſcovered. It is uſed alſo to prevent ſurprizes. The word is given out in an army every night to the lieutenant, or major general of the day, who gives it to the majors of the brigades, and they to the adjutants; who give it firſt to the field officers, afterwards to a ſerjeant of each company, who carry to the ſubalterns. In garriſons it is given, after the gate is ſhut, to the town major, who gives it to the adjutants, and they to the ſerjeants.

WORK-HOUSE, a place where indigent, vagrant, and idle people are ſet to work, and maintained with clothing, diet, &c.

Such is Bridewell, and ſeveral other places about the city, or ſuburbs; particularly that in Biſhopſgate-ſtreet, for employing the poor children of the city and liberties, who have no ſettlement; and that for the pa-

rifh of St. Margaret's, Weftminfter, called the grey-coat-hofpital.

At Amfterdam they have a famous work-houfe, or houfe of correction, called the Rafphuyfe, which, by a privilege granted in 1602, has alone the right of fhaving, and cutting the dyers woods, as brazil, fantal, campeche, faffafras, &c.

Each perfon, tolerably ftrong, kept in the houfe, is obliged to furnifh 250 pounds of rafped wood per day; and the weaker, a certain quantity of chips.

WORKS, *Opera*, in fortification, the feveral lines, trenches, ditches, &c. made round a place or army, or the like, to fortify and defend it.

WORLD, *Mundus*, the affemblage of parts which compofe the univerfe. See UNIVERSE.

The duration of the world, is a thing which has been greatly difputed. Plato, after Ocellus Lucanus, held it to be eternal; and to have flowed from God, as rays flow from the fun. Ariftotle was much of the fame mind: he afferts, that the world was not generated, fo as to begin to be a world, which before was none: and, in effect, his whole eighth book of *Phyf.* and firft book *de Cœlo*, is fpent in proving the eternity of the world.

He lays down a pre-exifting and eternal matter, as a principle; and thence argues the world eternal. His argument amounts to this, that it is impoffible an eternal agent, having an eternal paffive fubject, fhould continue long without action.

His opinion was generally followed; as feeming to be the fitteft to end the difpute among fo many fects about the firft caufe.

Epicurus, however, though he makes matter eternal, yet fhews the world to be but a new thing, formed out of a fortuitous concourfe of atoms. See *Lucretius*, Lib. V.

Some of the modern philofophers refute the imaginary eternity of the world, by this argument: that, if it be ab eterno, there muft have been a generation of individuals, in a continual fucceffion from all eternity; fince no caufe can be affigned why they fhould not be generated, viz. one from another. Therefore, to confider the origin of things, and the feries of caufes, we muft go back in infinitum, i. e. there muft have been an infinite number of men, and other individuals already generated; which fubverts the very notion of number. And if the caufe which now generates have been produced by an infinite feries of caufes; how fhall an infinite feries be finite, to give room for new generations?

Dr. Halley fuggefts a new method of finding the age of the world, from the degree of faltnefs of the ocean.

It is another popular topick of controverfy, whether the world be finite, or infinite?

It is likewife difputed, whether the plurality of worlds be poffible?

Some hold the affirmative, from an opinion of the infinite power of the Deity; it being a fetting bounds to omnipotency, to fay, that he created fo many bodies at firft, and that he could not create more.

The Cartefians maintain the negative, upon thefe principles: that it is a contradiction to fay, there are feveral worlds exifting at the fame time, fince this implies feveral univerfes of created beings, the world being the το παν. That if there were feveral worlds, they muft either be at a diftance from one another, or contiguous; but neither can be faid: for were they contiguous, they would only conftitute one; and were they diftant, there muft be fomething between. But what can be between? If it be extended, it is corporeal; and inftead of feparating the feveral worlds, will connect them into one.

The world is fometimes divided into upper and lower.

Lower, or fublunary WORLD, is the globe of our earth.

Upper WORLD, includes the heavens, and heavenly bodies.

WORMS, in the Linnæan fyftem of nature, a clafs of infects which have the mufcles of their body affixed to a folid bafis. The feveral fpecies of worms are very numerous; as the chætia, or the hair worm, called alfo the guinea worm; the afcaris, the lumbricus or the earth worm; the fea-worm; the tænia, or tape worm; the ficyania, or gourd worm; the iulus, or gally-worm, &c.

WORMS, in hufbandry, are very prejudicial to corn-fields, eating up the roots of young corn, and deftroying great quantities of the crop. Sea-falt is the beft of all things for deftroying them. Sea-water is proper to fprinkle on the land, where it can be had; where the falt fprings are, their water is fufficient; and where neither are at hand, a little common or bay-falt does as well. Soot will deftroy them in fome lands, but is not to be depended upon, for it does not always fucceed. Some farmers ftrew on their lands a mixture of chalk and lime; and others truft wholly to their winter-fallowing to do it, if this is done in a wet feafon, when they come up to the furface of the ground, and fome nails with fharp heads be driven into the bottom of the plough, the defired effect will be produced. If they are troublefome in gardens, the refufe brine of falted meat will ferve the purpofe; or fome walnut leaves fteeped in a ciftern of water for a fortnight or three weeks, will give it fuch a bitternefs that it will be a certain poifon to them. A decoction of wood afhes, fprinkled on the ground, will anfwer the fame purpofe; and any particular plant may be fecured both from worms and fnails, by ftrewing a mixture of lime and afhes about its roots. It is a general caution among the farmers to fow their corn as fhallow as they can, where the field is very fubject to worms.

WORMS, *Lumbrici*, or *Vermes*, in medicine, a difeafe arifing from fome of thofe reptiles being generated, and growing in the body: whence, frequently, dire fymptoms do proceed.

The ordinary place of the worms, is the inteftines: though there is fcarce any part of the body but is fometimes infected with them: for befides the vermes inteftinales, there are dentales, gingivales, pulmonarii, cardiaci, fanguinarii, cutaneous, umbilical, hepatick, falival, &c.

They are all ufually fuppofed to be ingendered from the eggs of fome infect, depofited in fomething that is taken into the body by way of food; or fome other way: an hypothefis, however, which will hardly account for certain fpecies of thefe infects, not to be found but in the bodies of animals. A folution of this difficulty will, perhaps, be hard to find, without having recourfe to the firft ftamina of animals, and the principles of generation.

There are three fpecies of worms, moft frequent in the human body: the teretes, or round and thick, moftly found in the duodendum; the latus, or flat, called alfo tœnia; and the round and fmall, found in the rectum, called afcarides. Sometimes, indeed, there are anomalous worms expelled; as horned, hairy, four-footed, two-headed, &c. worms.

The fymptoms of this difeafe are, vomiting, head-ach, heart-burn, fighing, fwooning, feeble pulfe, heavy fleep, deliria, fquinancy, pleurify, canine hunger, and innumerable others; occafioned by the animals fucking, moving, vellicating, gnawing, confuming the chyle, irritating the nerves, wounding the folids, &c.

As to the latus, befide the other common fymptoms, thofe affected with this, have one peculiar to them; which is, that with their ftools they difcharge feveral little bodies, like gourd-feeds.

Dr. Tyfon, in the Philofophical Tranfactions, N° 146. gives a curious account of the flat worm, or lumbricus latus; called by Hippocrates, ταινια, and in Englifh, ordinarily, the tape-worm, or joint-worm. This is always fingle: it lies varioufly convoluted; being fometimes as long as all the guts; and fometimes, vaftly exceeds that length.

Olaus Borrichius affures us, a patient of his, in a year's time, voided 800 foot of this worm, though he had not yet met with the head: in voiding, the patient always obferved it to break off.

Dr. Tyfon parallels this cafe with that of a patient of his, who voided vaft quantities of this worm, for feveral years together; but in various pieces: fome two, three, four, fix, or more yards long: but all put together, he fays, would much exceed the length of that of Borrichius.

The joints in this worm are very numerous: in one of 24 feet long, Dr. Tyfon numbered 507 joints. Above the middle of the edges of each joint, he obferved a protuberant orifice. Thofe orifices he takes for fo many mouths; the beft microfcopes difcovering no mouth in what ufually paffes for the head.

The worm is frequent enough in moft kinds of animals; as dogs, oxen, crabs, herrings, pikes, &c. Some authors affert that it is not one, but many worms linked together,

together, and included in a ſpolium of the inteſtines; and that this ſpolium is not animated, but receives its ſenſe and motion from a ſort of vermiculi cucurbitini incloſed in it. This, Gabucinus, *de Lumb. Com.* ſays, he has plainly diſcovered: but Dr. Tyſon abundantly evinces the contrary.

In Perſia, &c. there are very long ſlender worms, ſix or ſeven yards long, bred in the legs, and other parts of men's bodies: when arrived at a certain pitch, they put out their heads, necks, &c. and withdraw them (if diſpleaſed or hurt) again, cauſing intolerable pains, fevers, &c.

Ariſtotle obſerves, that all deer have worms under their tongues. Sheeps noſes often abound with them.

In the Philoſoph. Tranſact. N° 113, we have accounts of divers remarkable operations whereby worms were taken out of divers unſuſpected parts of the body; the operators being chiefly women. Mrs. Mary Haſtings is there recorded, as famous for the diſcovering of worms hid in the face, gums, tongue, &c. which ſhe managed with ſuch addreſs, that ſhe took them out of any part affected, with a gooſe-quill. Mr. Dent relates, that he himſelf was cured of certain odd tumours on his tongue, by one of thoſe worm-doctreſſes, Mrs. French; who, piercing the parts affected with a lancet, drew out five or ſix worms at a time. In leſs than eight days, he aſſures us, ſhe took out of his tongue above a hundred worms, and thirty out of his gums.

Sir Theodore Mayerne aſſures us, in the Philoſoph. Tranſact. N° 211, that the famous ſugar, or remedy given by Pontæus, (a celebrated chymical empirick) for the worms in children, is fifteen grains of mercurius dulcis, with five grains of ſcammony, or two or three times as much ſugar, made up in lozenges. He adds, that this doſe, which in France purges grown perſons, is ineffectual in England, to perſons of above fifteen years old, and ought to be augmented.

Worm, in gunnery, a ſcrew of iron to be fixed on the end of a rammer, to pull out the wad of a firelock, carabine, or piſtol, being the ſame with the wadhook, only one is more proper for ſmall arms, and the other for cannon.

Worm, in chymiſtry, denotes a long, winding pewter-pipe, which diſtillers and apothecaries place in a tub of water, to cool and condenſe the vapours in the diſtillation of ſpirits.

This the chymiſts alſo call a ſerpentine. Formerly, this worm, or ſomething like it, was placed above the head of the ſtill, with a refrigeratory at the upper end of it, which is uſeful enough in the diſtilling of ſpirit of wine.

Worm, a cable, or hawſer, in the ſea-language, is to ſtrengthen it by winding a ſmall line all along between the ſtrands.

To Worm *a Dog*, is to take out a kind of worm from under his tongue; which, if let alone, would make him mad.

Worm-Seed, *Semen contra*, *ſemen ſanctum*, or *ſemen ſantonicum*, is a hot, bitter, drying kind of ſeed, proper to deſtroy worms generated in a human body, particularly in children.

This ſeed is ſmall, of a browniſh colour, an oblong figure, a bitter taſte, and a ſtrong ſmell. It muſt be choſen new, greeniſh, of a ſharp, bitter, aromatick taſte, not a little diſagreeable.

The place where it is produced, is Perſia, about the frontiers of Muſcovy. It is brought to us from Aleppo, &c. Naturaliſts are not agreed about the plant that produces it. J. Bauhine has a large diſſertation on the ſubject. Some will have it the ſpecies of abſynthium, or wormwood, called ſantonicum, or marinum, abſynthium; others will have it the tanacetum, others the abrotanum.

M. Tournefort gives us the following account of this notable drug, in the ſecond volume of his travels. The ſementine, or worm-powder, is not gathered like our ſeeds. The plant grows in the meadows, and muſt be let ripen; and the miſchief is, that as it grows near to maturity, the wind ſcatters a good part of it among the graſs, where it is loſt; and this it is makes it ſo dear.

As they dare not touch it with the hand, for fear of making it ſpoil the ſooner; when they would gather what is left in the ear, they have recourſe to this expedient. They take two hand-baſkets, and, walking along the meadows, ſweep the baſkets, the one from right to left, the other from left to right, as if they were mowing; by this means the ſeed is ſhook out into the baſkets.

WORMWOOD, *Abſinthium*, in botany, a genus of plants, whoſe flower is compoſed of many tubuloſe hermaphrodite florets, which form the diſck, and ſeveral female florets, which are naked and compoſe the rays, they are contained in a roundiſh imbricated cup, and are ſucceeded by naked ſeeds, affixed to a hairy receptacle.

The common wormwood is perennial, and has a ligneous and fibrous root, with ſtalks of an indeterminate height, branched out into many ſmall ſhoots, with large, hoary, mingled, and ſerrated leaves, of a ſtrong pungent ſmell, and bitter taſte. In the beginning of July, it produces ſeveral ligneous ſtriated branches, having at their tops each a ſpike of ſmall flowers, of a pale yellow, growing many together. This ſort grows uſually by the ſides of highways and foot-paths, in many parts of England; but the Roman wormwood, which has leaves much ſmaller than the other, is propagated in gardens, and may eaſily be raiſed by planting the ſlips in the ſpring or autumn.

Of wormwood, there are only four ſorts uſed in medicine, viz. the Roman wormwood, the ſmall ſort or pontick, the ſea wormwood, and the abſinthium alpinum; beſides theſe, botaniſts make twenty-eight other kinds, which are all included by Linnæus among the artemiſias.

Wormwood has always been looked upon as a valuable medicine, to promote the heat and circulation of the blood, and to recover the oſcillation of the fibres, when ſluggiſh; by which means, the groſs humours are attenuated, and brought back into the common road of circulation: it reſtores the debilitated functions of the viſcera, and is an excellent ſtomachick: it is good in the dropſy, green ſickneſs, cachexies, and agues, which laſt it has often been known to cure. It alſo, by its great bitterneſs, is of ſome ſervice againſt worms, by reſolving the mucilaginous humours in which their eggs are contained: however, in all hot diſeaſes and inflammatory diſpoſitions it is not ſafe.

WORSHIP *of God*, *Cultus Dei*, amounts to the ſame with what we otherwiſe call religion.

This worſhip conſiſts in paying a due reſpect, veneration, and homage to the Deity, under different modes, according to the ſeveral parts of the world; as prayers, ſacrifices, thankſgivings, &c.

But true worſhip is that internal religion of the heart, without which, all outward forms of worſhip are but of little account: *Bodily exerciſe profiteth little*; *but* true internal *godlineſs is profitable unto all things, having the promiſe of the life that now is, and of that which is to come.* 1 Tim. iv. 8.

The Quietiſts, and ſome other myſtick divines, ſet aſide not only all uſe of external worſhip, but the conſideration of rewards and puniſhments.

Yet, even the heathens had a notion, that God did not require us to ſerve him for nought: Dii quamobrem colendi ſunt, ſays Cicero, non intelligo, nullo nec accepto ab illis nec ſperato bono.

The ſchool-divines divide worſhip into divers kinds, viz. latria, that rendered to God; and idolatria, that rendered to idols, or images. To which the Romaniſts add, dulia, that rendered to ſaints; and hyperdulia, that to the virgin

WORSTED, or Woolsted, in matters of commerce and manufacture, is a kind of woollen thread.

Worſted is, properly, a thread ſpun of wool that has been combed, and which, in the ſpinning, is twiſted harder than ordinary.

It is chiefly uſed either to be knit, or wove into ſtockings, caps, gloves, or the like.

The name worſted, is ſuppoſed to be borrowed from a town thus called, in Norfolk, noted for fine ſpinning. They who write it woolſted, do it on a ſuppoſition of the word's being formed from wool, the matter of this thread.

WOULDING, a ſea term for the winding of ropes round a maſt or yard of a ſhip, that has been ſtrengthened by a piece of timber nailed to it.

WOUND, *Vulnus*, in medicine and chirurgery, a recent ſeparation, made in the ſoft or fleſhy parts of the body, from an external cauſe; and particularly the action of ſome hard and ſharp inſtrument.

Or, it is a ſolution of the continuity of a fleſhy part, made by ſome penetrating body; while it yet remains freſh, bloody, and without putrefaction: by which cir cumſtances a wound is diſtinguiſhed from an ulcer.

A like ſeparation happening in a bony part, is called a fracture.

All wounds proceed either from puncture, inciſion, or contuſion, according to the nature and make of the inſtrument they were cauſed by.

Wounds are uſually divided, with reſpect to their cauſe, circumſtances, cure, &c. into ſimple and compound. Simple wounds are thoſe made by puncture, inciſion, or contuſion ſeparately; thoſe of the outer ſkin, without any conſiderable loſs of ſubſtance, or hurting any remarkable veſſel; and thoſe not complicated with any dangerous ſymptoms.

Compound wounds, are thoſe made both by puncture and inciſion at the ſame time, to which is ſometimes alſo added contuſion; thoſe attended with great loſs of fleſh, or the hurt of ſome conſiderable veſſel; and, thoſe made by envenomed inſtruments, or attended with violent ſymptoms.

The hiſtory of a wound is thus delivered by Boerhaave. Immediately upon the ſolution, the wounded parts recede further and further from each other. The blood guſhes out, at firſt, with ſome violence; but ſtops of itſelf: then a bloody ſcab is formed in the cavity of the wound, and a thin ruddy humour oozes out; the lips of the wound begin to redden, ach, ſwell, and turn back; and (in great wounds) a fever and thirſtineſs ſucceed. On the third or fourth day, there is found a white, viſcid pus; upon which, the hear, redneſs, tumour, &c. abate, and the cavity gradually fills up from the bottom upwards, and from the circumference to the centre with growing fleſh. Laſtly, the wound dries, and cicatrizes.

But note, theſe ſymptoms vary according to the nature and cauſe of the wound. Thus, if it be by inciſion, and a large blood-veſſel be cut, the hæmorrhage is more violent; eſpecially if it be an artery; in which caſe florid blood flies out impetuouſly, and by ſtarts: if only a vein be cut, the flux is more moderate and equable, and the blood of a darker colour. If the wound be attended with contuſion, the hæmorrhage is ſmall.

In wounds, where any large artery is quite cut in two, the flux uſually proves mortal. A leſs artery, cut tranſverſely, flies back againſt the ſolid parts, and will have its mouth ſtopped: if an artery be not quite cut off, there ariſes a perpetual flux; or, if that be ſtopped, an aneuryſma. A nerve being cut off, flies back, produces a pain, and obſtruction about the wound; and below it, a numbneſs, and waſting immobility: the caſe is much the ſame in wounded tendons, and membranes. Wounds of the temporal muſcle are rarely cured; but generally bring on horrible convulſions.

The following wounds are commonly reputed mortal; viz. thoſe of the cerebellum, and of the cerebrum if they be deep enough to hurt the medulla oblongata; deep wounds in the ſpinal marrow, eſpecially the upper part thereof; thoſe of the heart, lungs, liver, ſpleen, kidneys, pancreas, meſentery, ſtomach, inteſtines, &c. is thoſe of the cava, aorta, carotides, pulmonary, and other large veins and arteries; thoſe of the bronchia, thorax, diaphragm; large wounds of the oeſophagus, trachea, and the bladder; and all invenomed wounds.

In young children, and aged perſons, wounds frequently prove mortal, which ſeemed but ſlight. Thoſe wounds generally prove troubleſome which happen in an ill ſtate of body, and eſpecially a low, or ſpare diet. All wounds are reputed more dangerous and difficult of cure in winter, than ſummer; in autumn, than in ſpring.

The cure of wounds conſiſts in uniting the divided parts; which is the work of nature alone, and which the chirurgeon can only contribute to by removing external impediments, and applying medicines familiar to the part, called vulneraries, and balſamicks.

The firſt ſtep, then, to be taken in a ſimple wound, is to cleanſe it, and extract any heterogeneous body that may chance to be lodged therein. Next, the cavity to be gently wiped with doſſils dipt in warm red wine. The lips now to be brought together by bandages or ſutures; and the wound to be covered with a pledget dipt in balſam of Peru, or oil of ſweet almonds. The pain thus eaſed, and the ſymptoms removed, the wound is to be ſuppurated, deterged, incarnated, and cicatrized after the manner of tumours and ulcers.

If the wound be dangerous, the ſymptoms violent, and the body cacochymick, more powerful means are had recourſe to; as, firſt, phlebotomy, then gentle cathartics, or clyſters; then vulnerary drinks, apozems, and ptiſans; with cardiacks and paregoricks interpoſed. In internal wounds, vulneraries and alkalies do well, particularly album græcum, river lobſters, mercurials, &c.

Freſh wounds are cured, ordinarily, in three or four days, without any other means, than applying a few drops of balſam of Peru. Sometimes, however, digeſtives are required.

Gun-ſhot wounds are uſually the worſt of all, by reaſon of the violent contuſion and ſeparation of the parts; which prevent their coming to digeſtion for the ſpace of three or four days.

In the cure of large wounds, bandages and ſutures are required, to fit and diſpoſe them for healing.

Wounds *in Horſes*. The moſt terrible wounds theſe creatures are ſubject to, are thoſe got in the field of battle. The farriers that attend camps have a coarſe way of curing theſe; but it is a very expeditious and effectual one.

If the bullet be within reach, they take it out with a pair of forceps; but if it lie too deep to be come at, they leave it behind, and dreſs up the wound in the ſame manner as if it were not there. They firſt drop in ſome varniſh from the end of a feather, and when the bottom is thus wetted with it, they dip a pledget of tow in the ſame varniſh, which they put into the wound, and then cover the whole with the following charge: take a quarter of a pound of powder of bole armoniack, half a pound of linſeed oil, and three eggs, ſhells and all; add to theſe, four ounces of bean-flour, a quart of vinegar, and five ounces of turpentine; this is all to be mixed over the fire, and the wound covered with it.

This application is to be continued four or five days; then the tent put into the wound is to be dipped in a mixture of turpentine and hogs-lard; by this means a laudable matter will be diſcharged, inſtead of the thin ſharp water that was at firſt. Then the cure is to be completed by dreſſing it with an ointment made of turpentine, firſt well waſhed, and then diſſolved in yolks of eggs, and a little ſaffron added to it.

This is the practice in deep wounds that do not go through the part; but in caſes where the bullet has gone quite through, they take a few weavers linen thrumbs, made very knotty; theſe they make up into a kind of link, and dipping it in varniſh, they draw it through the wound, leaving the ends hanging out at each ſide; by means of theſe they move the link or ſkain three or four times a day, always wetting the new part that is to be drawn into the wound with freſh varniſh.

They put on a charge of bole armoniack, &c. as before deſcribed, on each ſide of the wounded part, and continue this as long as the wound diſcharges thin watery matter, or the ſides continue ſwelled. After this, they dreſs it with the ointment of turpentine, yolks of eggs, and ſaffron, till it is perfectly cured.

WREATH, in heraldry, a roll of fine linen, or ſilk, (like that of a Turkiſh turbant) conſiſting of the colours born in the eſcutcheon; placed, in an atchievement, between the helmet and the creſt, and immediately ſupporting the creſt.

WRECK, Wrack, or *Sea*-Wreck, in natural hiſtory, a kind of herb growing in the ſea, upon rocks, and which the waves tearing off, caſt upon ſhore.

In ſome places it is uſed to manure the ground. In Normandy, and other parts, they burn it; and of the aſhes make a kind of ſoda, which they uſe in the making of common green glaſs, to promote the fuſion or vitrification of the other materials.

Wreck, or *Ship*-Wreck, in law, is when a ſhip periſhes on the ſea, and no perſon eſcapes alive out of it. In this caſe, if the ſhip ſo periſhed, or any part thereof, or the goods of the ſhip come to the land of any lord, and are left there, the lord ſhall have the ſame, as being a wreck of the ſea; but if any ſingle perſon, or even a dog, or other living creature, eſcape alive out of the ſhip, the party to whom the goods belong, may come within a year and a day, and proving the goods to be his,

he shall have them again. And it is held, that they are no wrecks so long as they remain at sea, within the jurisdiction of the admiralty.

It is enacted by 12 Ann. c. 18. that if a wreck happen by any fault or negligence of master or mariners, the master must make good the loss; but if the same was occasioned by tempest, enemies, &c. he shall be excused: making holes in ships, or doing any thing wilfully tending to the loss thereof, is by that statute declared felony.

Wreck, in metallurgy, a vessel in which the third washing is given to the ores of metals.

WRESTLING, a kind of combat, or engagement between two persons, unarmed, body to body, to prove their strength and dexterity; and try which can throw his opponent to the ground.

Wrestling, palæstra, is an exercise of very great antiquity and fame. It was in use in the heroick age, witness Hercules, who wrestled with Antæus.

It continued a long time in the highest repute, and had very considerable rewards and honours assigned it at the Olympick games. It was the custom for the athletæ to anoint their bodies with oil, to give the less hold to their antagonist.

Ablancourt observes, that Lycurgus ordained the Spartan maids to wrestle in publick, quite naked, to break them of their too much delicacy and niceness; to make them appear more robust, and to familiarize the people, &c. to such nudities.

Wrist, *Carpus*, in anatomy, a part of the hand, consisting of eight small, unequal, and irregular bones, all which taken together, represent a sort of grotto, of an irregular quadrangular figure, and connected principally with the basis of the radius.

Wrist, in the menage. The bridle-wrist is that of the cavalier's left hand. A horseman's wrist and his elbow should be equally raised, and the wrist should be two or three fingers above the pummel of the saddle.

WRIT, *Breve*, in law, a precept of the king in writing, under seal, whereby any thing is commanded to be done, touching a suit, action, or process for justice. As, the summoning a defendant, taking a distress, redressing disseisin, or the like.

Writs are variously divided, and in various respects. Some, with regard to their order, or manner of granting, are terminated original, and others judicial.

Original Writs, are those sent out of the high court of chancery, to summon the defendant in a personal, or tenant in a real action; either before the suit begins, or to begin the suit thereby.

Judicial Writs are those sent by order of the court where the cause depends, upon emergent occasions, after the suit begins.

Judicial Writs are distinguished from original, in that their teste bears the name of the chief justice of that court whence they come; whereas the original are, teste meipso, in the name, or relating to the king.

Writs are also distinguished, according to the nature of the action, into real and personal. Real, are either touching the possession, called writs of entry; or the property, called writs of right.

Personal Writs, are those relating to goods, chattels, or personal injuries.

To which may be added, mixt writs, for the recovery both of the thing and damages.

Some writs, again, are at the suit of the party; some, of office; some, ordinary; some, of privilege. A writ of privilege, is that which a priviledged person brings to the court for his exemption, by reason of some privilege which he enjoys.

Writ *of Assistance*, is a warrant that issues out of the Exchequer, to authorize persons to take a constable, or other publick officer, to seize goods or merchandizes prohibited and uncustomed, &c. by virtue of which writ, any person may, in day time, and in the presence of such constable, &c. break open doors, chests, warehouses, and other places, to search for and seize uncustomed goods.

There is also a writ of this name that is used to give possession of land; and likewise for the general assistance of sheriffs, &c.

Writ *of Inquiry and Damages*, a judicial writ that issues out to a sheriff upon a judgment by default, in action of the case, covenant, trespass, trover, &c. commanding him to summon a jury to inquire what damages the plaintiff hath sustained, occasione præmissorum; and when this is returned with the inquisition, the rule for judgment is given upon it; and if nothing be said to the contrary, judgment is thereupon entered.

Writ *of Rebellion*, is a writ issuing out of the court of Chancery, or Exchequer, against a person who is in contempt for not appearing in one of these courts, &c.

Writs *Vicountiel*, are such as are triable in the sheriff's, or county court.

WRITER *of the Tallies*, an officer of the Exchequer, being clerk to the auditor of the receipt, who writes upon the tallies the whole letter of the teller's bill.

WRITING, *Scriptura*, the art or act of signifying and conveying of our ideas to others, by letters, or characters visible to the eye.

Writing is now chiefly practised among us by means of pen, ink, and paper; though the ancients had other methods.

To write without blacking the fingers, Mr. Boyle directs as follows: prepare the paper with a fine powder made of three parts of calcined copperas, two of galls, and one of gum arabick; these being fresh mixed, rub them with a hare's foot into the pores of the paper, and write with fair water, and the letters will immediately appear black.

To make new writing appear old, the same author directs to moisten it well with oil of tartar per deliquium, more or less diluted with water, as you desire the ink to appear more or less decayed.

We may write without ink or its materials: for this purpose, take a fine powder of calcined hartshorn, of clean tobacco-pipes (or rather of mutton bones burnt to a perfect whiteness) and rub it upon the paper, and then write with a silver bodkin, or the like.

WYCH-House, a house in which salt is boiled.

WYDRAUGHT, a water-course, or water-passage, to carry off the filth of a house; properly a sink, or common sewer. See Cloaca and Sewer.

WYKE, anciently signified a farm, hamlet, or little village.

Wyte, Wyta, *or* Wite, Wita, in our ancient customs, a pecuniary penalty, or mulct.

The Saxons had two kinds of punishments, were, and wyte; the first, for the more grievous offences.

The wyte was for the less heinous ones. It was not fixed to any certain sum; but left at liberty, to be varied according to the case.

Hence, also, wyte, or wittree, one of the terms of privilege granted our portsmen; signifying a freedom or immunity from fines, or amercaments: or, as it is vulgarly conceived, from being liable to be begged for fools, for lack of wit.

Wyta, *or* Wita *Plena*, signified a forfeiture of one hundred and twenty shillings. Si pundbreche fiat in curia regis plena wita sit; alibi quinque marcæ.

To swear according to the wyte, secundum witam jurare, was to purge one's self by the oaths of so many witnesses, as the nature of the crime, and the punishment, or wyte, did require.

Hence, also, bloodwite, legerwite, ferdwite, childwite, wardwite, &c.

WYTHE, in law, the same as waif.

X.

X, A double consonant, and the twenty-second letter of the English alphabet.

The letter X was not used by the Hebrews or ancient Greeks; for as it is not a simple but compound letter, the ancients, who used great simplicity in their writings, expressed it by *cs*, the letters which compose it; thus, instead of the modern πλέξω, the ancient Atticks wrote πλέκσω.

X is also a numeral letter, signifying ten, as it represents two V's placed one on the top of the other.

When laid flat, thus ⋈, it signifies a thousand; and when a dash is added over it, as $\bar{X}$, it signifies ten thousand.

XANTHICA, in antiquity, a Macedonian festival, so called because it was observed in the month Xanthus, the same with our April.

XANTHIUM, the lesser burdock, in botany, a genus of plants, producing male and female flowers; the corolla is compound, uniform, tubulose, and equal, and disposed in an hemispherical form; the partial flower is monopetalous, tubulose, funnel-shaped, erect, and divided into five segments at the limb: the fruit is a dry ovato-oblong berry, bifid at the apex, hairy, and covered with hooked prickles, containing an oblong seed, plane on one side, and convex on the other.

XERANTHEUM, the Austrian sneeze-wort, in botany, a genus of plants, whose flower is compound and unequal; the corollulæ, which form the disck, are tubulose and hermaphrodite; and a few female quinquifid florets compose the radius: there is no pericarpium; but the cup, which is imbricated and cylindrick, contains the seeds, which are oblong and crowned with hair.

The flowers of these plants being gathered when full blown, and properly dried, will continue fresh and beautiful several months; and by dipping them into various tinctures, they may be stained of different colours. They are propagated by sowing the seeds, either in spring or autumn, and afterwards the plants should be set where they are intended to blow.

XEROPHAGIA, in church-history, the eating of dried foods: so the ancient Christians called certain fast days, on which they eat nothing but bread and salt, and drank only water: sometimes they added pulse, herbs, and fruits. This sort of fasting was observed chiefly in the holy week, out of devotion, and not by obligation.

XESTA, an Attick measure of capacity. See the article MEASURE.

XIPHIAS, a fiery meteor, in form of a sword. It differs from the acontias in this, that the latter is longer and more like a dart; and the former shorter and broader in the middle.

XIPHOIDES, in anatomy, a cartilage adhering to the sternum; called also cartilago ensiformis.

XYLO-ALOES, or ALOE-WOOD, in pharmacy, a drug distinguished into three sorts; the calamback, the common lignum aloes, and calambour.

The calamback, or finest aloe-wood (called by authors lignum aloes prestantissimum, and, by the Chinese, sukhiang) is the most resinous of all the woods we are acquainted with: it is of a light spongy texture, very porous, and its pores so filled up with a soft and fragrant resin, that the whole may be pressed and dented by the fingers like wax, or moulded about by chewing in the mouth, in the manner of mastick.

This kind, laid on the fire, melts in great parts like resin, and burns away in a few moments, with a bright flame and perfumed smell. Its scent, while in the mass, is very fragrant and agreeable; and its taste acrid and bitterish, but very aromatick and agreeable: it is so variable in its colour, that some have divided it into three kinds; the one variegated with black and purple; the second, with the same black, but with yellowish instead of purple; and the third, yellow alone, like the yolk of an egg: this last is the least scented of the three; the substance, however, in them all, is the same in every respect, except the colour. It is brought from Cochinchina.

The lignum aloes vulgare, is the second in value. This is of a more dense and compact texture, and consequently less resinous than the other: there is some of it, however, that is spongy, and has the holes filled up with the right resinous matter; and all of it, when good, has veins of the same resin in it.

We meet with it in small fragments, which have been cut and split from larger; these are of a tolerably dense texture, in the more solid pieces, and of a dusky brown colour, variegated with resinous black veins. It is in this state very heavy, and less fragrant than in those pieces which shew a multitude of little holes, filled up with the same blackish matter that forms the veins in others. The woody part of these last pieces is somewhat darker than the other, and is not unfrequently purplish, or even blackish. The smell of the common aloe-wood is very agreeable, but not so strongly perfumed as the former. Its taste is somewhat bitter and acrid, but very aromatick. This is also brought from Cochinchina, and sometimes from Sumatra.

The calambour, or, as some write it, the calambouck, is also called agallochum sylvestre, and lignum aloes Mexicanum. It is a light and friable wood, of a dusky and often mottled colour, between a dusky green black, and a deep brown. Its smell is fragrant and agreeable, but much less sweet than that of either of the others; and its taste bitterish, but not so much acrid or aromatick as either of the two former. We meet with this very frequently, and in large logs; and these sometimes entire, sometimes only the heart of the tree, the cortical part being separated. This is brought from the island of Timor, and is the aloe-wood used by the cabinet-makers and inlayers.

It is esteemed a cordial, taken inwardly; and they sometimes give it in disorders of the stomach and bowels, and to destroy worms. A very fragrant oil may be procured from it by distillation, which is recommended in paralytick cases, from five to fifteen drops.

XYLO-BALSAMUM, a name which naturalists give to the wood of the tree which yields that precious gum known to the Latins by the name of opobalsamum, and to us by the name of balm of Gilead.

We have branches of this tree brought from Cairo; they are very straight, brittle, unequal, and full of knots; their bark is redish without, and greenish within.

XYNOECIA, a feast among the ancient Athenians, instituted on occasion of Theseus's uniting all the petty communities of Attica into one commonwealth; the assemblies whereof were to be held at Athens, in the Prytaneum.

XYSTARCHA, in antiquity, the master or director of the xystus.

In the Greek gymnasium, the xystarcha was the second officer; the first was the gymnasiarcha. The xystarcha was his lieutenant, and presided over the two xysti, and all exercises of the athletæ therein.

XYSTUS, in ancient architecture, among the Greeks, was a long spacious portico, wherein the athletæ, and others, practised wrestling and running.

XYSTUS, among the Romans, was an alley, or double row of trees, interweaving their boughs a-top, and a shade to walk under.

Y, The

Y.

Y The twenty-third letter of our alphabet, and one of the ambigenial letters, being a confonant in the beginning of words, and placed before all vowels, as in yard, yield, &c. but before no confonant; but at the end of words it is a vowel, and fubftituted for the found of i, as in try, defcry. In the middle of words it is not ufed fo frequently as i is, unlefs in words derived from the Greek, as in chyle, empyreal; though it is admitted into the middle of fome pure Englifh words, as in dying, flying, &c.

Y is alfo a numeral, fignifying 150, or, according to Baronius, 159; and, with a dafh over it, thus, Ȳ, it fignified 150,000.

YACHT, or Yatch, a kind of veffel ufed by the Englifh, furnifhed with mafts and fails, fit to go by fea, and commodioufly contrived and adorned, withinfide and without, to fuit it for ftate-paffengers, &c.

Yatchts are veffels with one deck, carrying from four to 12 guns, with from 20 to 40 men; being of burden from 30 to 160 ton. They draw little water, and are ufed for running, and making fhort trips, &c. Their make and form is various.

The Dutch have alfo yachts, but not fo well prepared to live at fea. They are feldom ufed, but to fail on rivers and canals.

YAM, the name of a plant much cultivated in the Weft-Indies: the root is the fize of a man's leg, of an irregular form, and of a dirty brown colour on the outfide, but, when cut, is white and mealy within.

The ftalks of this plant are triangular and winged; the leaves are heart-fhaped; the ftalks climb to the height of ten or twelve feet, when they grow near trees or fhrubs, to which they faften themfelves, otherwife they trail on the ground.

Yams are propagated by cutting the root into pieces, obferving to preferve an eye or bud to each, as is practifed in planting potatoes; each piece being planted, will grow and produce three or four large roots. In America, they are fix or eight months in the ground before the roots are taken up for ufe. Thefe roots are roafted or boiled, and eaten by the inhabitants, and fometimes made into bread.

This plant cannot be preferved in this country without the affiftance of a hot-houfe, on account of its tendernefs and fufceptibility of cold.

YARD, *Virga*, a long meafure, ufed in England and Spain, chiefly to meafure cloth, ftuffs, &c. See the article Measure.

The Englifh yard contains three feet. It was firft fettled by Henry I. from the length of his own arm.

The Englifh yard is juft feven-ninths of the Paris ell, fo that nine yards make feven ells. To reduce ells, therefore, into yards, fay, if feven ells give nine yards, how many yards will the given number of ells give?

Yards are converted into ells Flemifh, by adding a third part; into ells Englifh, by fubtracting a fifth part; or multiplying by eight, and cafting off the right-hand figure. Ells Englifh are converted into yards, by adding a fourth. To turn ells Flemifh into yards, fubtract one quarter.

The Spanifh vara, or yard, chiefly ufed at Sevil, is, in fome places, called barra. It contains $\frac{17}{24}$ of the Paris ell, fo that 17 ells make 24 Spanifh yards.

Yard, in anatomy, the penis, or virile member; ferving for the evacuating of the urine and feed.

Yards, or *Sail*-Yards, of a fhip, are long pieces of timber, tapering at each end, fitted acrofs the feveral mafts, to carry the fails.

The fails are faftened to the yards at the heads, fo as to be hoifted up and let down together with them, by ropes called halliards.

The main yard, is that of the main-maft. The mizzen yard, the bolt-fprit yard, &c. are thofe of the mizzen, &c.

They have feveral phrafes, and words of command, relating to the management of the yards, as, Brace the yard, which fignifies to traverfe aft the yard-arm, whofe brace is haled; fo that to traverfe the yard, is the fame as to fay, brace it aft. Square the yard, is as much as to fay, fee that it hang right a-crofs the fhip, and one yard-arm not traverfed more than the other. Top the yards, that is, make them hang even.

Yard-Arm, is that half of the yard that is on either fide of the maft, when it lies athwart the fhip.

Yard-Land, is taken to fignify a certain quantity of land, in fome counties being fifteen acres, and in others twenty; in fome twenty-four, and in others thirty and forty acres.

Yards alfo denote places belonging to the navy, where the fhips of war, &c. are laid up in harbour.

The king's yards are Chatham, Deptford, Woolwich, Portfmouth, Sherenefs, Plymouth, and Harwich; each of which is provided with feveral docks, wharfs, launches, and graving places for the building, repairing, and cleaning his majefty's fhips.

YARE, among failors, implies as much as, nimble, ready, quick, expeditious. Hence, to be yare at the helm, as fome fay, fignifies to fet a frefh man at the helm.

YARN, wool or flax fpun into thread, of which they weave cloth.

YARRINGLES, or Yarringle *Blades*, a kind of reel, or inftrument, with which hanks of yarn are wound on to clues, or balls.

YAWNING, *Ofcitatio*, an involuntary opening of the mouth, occafioned by a vapour, or ventofity, endeavouring to efcape; and generally witneffing an irkfome wearinefs, or an inclination to fleep.

The remedy Hippocrates prefcribes againft continual yawnings, is to make long breathings, or refpirations. The fame he recommends againft the hiccough.

The nervous membrane of the œfophagus, has been held the feat of yawning, which, according to the ufual fyftem, is produced, whenever any irritation determines the fpirits to flow thither in too great abundance. The caufe of the irritation is fuppofed to be fome troublefome humour, wetting the inner membrane of the œfophagus; which humour may proceed either from the glands fpread throughout that membrane, or from acid vapours arifing from the ftomach, and condenfing on the fides of the œfophagus. By fuch means, the nervous fibres of the membrane of the gullet being irritated, dilate the gullet; and the mouth is conftrained to follow the fame motion, as being lined with the fame membrane. But this fyftem of ofcitation has, of late, given way to a better, and more mechanical one.

Yawning is performed by expanding almoft all the mufcles of voluntary motion at the fame time; but moft confiderably thofe of the lungs: by infpiring a great quantity of air, very flowly, and after retaining it fome time, and rarifying it, by expelling it again, flowly, and reftoring the mufcles to their natural ftate.

Hence, its effects are to move, accelerate, and diftribute all the humours of the body, equably through all the veffels; thereby difpofing the organs of fenfation, and all the mufcles of the body, for the performance of their refpective functions.

YAWS, or Yawes, in the fea-language. A fhip is faid to make yawes, when, through the fault of him at the helm, fhe is not kept fteady in her courfe; but makes angles in and out.

To prevent this, the conner cries to him at the helm fteady, fteady.

YAWS, a diſtemper endemial to Guinea and the hotter climates in Africa.

YEAR, *Annus*, the time the ſun takes to go through the twelve ſigns of the zodiack. This is properly the natural or tropical year, and contains 365 days, 5 hours, and 49 minutes; or, rather, of 365 days, 5 hours, 48 minutes, and 57 ſeconds.

The viciſſitude of ſeaſons ſeems to have given occaſion to the firſt inſtitution of the year. Man, naturally curious to know the cauſe of that diverſity, ſoon found it was the proximity and diſtance of the ſun; and, upon this, gave the name year to the ſpace of time wherein that luminary, performing his whole courſe, returned to the ſame point of his orbit.

And hence, as it was on account of the ſeaſons, in a great meaſure, that the year was inſtituted, their chief regard and attention was, that the ſame parts of the year ſhould always correſpond to the ſame ſeaſons; i. e. that the beginning of the year ſhould always be when the ſun was in the ſame point of his orbit; and that they ſhould keep pace, come round, and end together.

This different nations aimed to attain by different ways, making the year to commence from different points of the zodiack, and even the time of his progreſs different. So that ſome of their years were much more perfect than others, but none of them quite juſt; i. e. none of them but whoſe parts ſhifted, with regard to the parts of the ſun's courſe.

The Greeks counted their year by the motion of both ſun and moon; and finding that there was 11 days difference between the lunar and ſolar years, at firſt they added an intercalary month every two years, containing 22 days. Afterwards, conſidering the 6 hours alſo, they put their emboliſm off 4 years, and then making the three firſt years to contain 354 days each, this made the fourth year to have 399 days: and to make this intercalation the more remarkable, they inſtituted the Olympick games on every ſuch fourth year; whence came the computation by Olympiads.

The Egyptians had two ſorts of years, the erratick and the fixed, or actiack. The erratick was called the Nabonaſſarean, from the epocha which takes its riſe from Nabonaſſar, king of the Chaldees. As it neglects the ſix hours, which, in the Julian form, make a leap-day once in four years, its beginning anticipates the Julian every fourth year by a day, and therefore it is juſtly called erratick.

The anticipation of one day in 4 years, gains of the Julian years 1 in 1460; ſo that 1461 Nabonaſſarean years make but 1460 Julian years.

The fixed Egyptian year obſerves the Julian form of 365 days and 6 hours, making a leap-day of the 6 hours once in 4 years. It differs from the Julian in this, that its months are the ſame with thoſe of the Nabonaſſarean; that it begins on Auguſt 29, inſtead of January 1, or, on Auguſt 30, if it be a leap-year; that it takes in the leap-day, not in February, but at the end of the year.

The Perſian erratick year goes by the name Yezdegerdick, by reaſon that the Perſian epocha commences from the death of Yezdegird, the laſt Perſian king, who was killed by the Saracens. It conſiſts of 12 months, containing 30 days each, and 5 ſupernumerary ones; ſo that it differs from the Nabonaſſarean only in the names of the months, and the commencement of the epocha.

The Gelalean year, uſed alſo by the Perſians, is very well adapted to the ſolar motions. It takes in a leap-day every fourth year, but every ſixth or ſeventh turn it throws it forward to the fifth year, by which means the equinoxes and ſolſtices are fixed to almoſt the ſame days of the month.

The Syriack year conſiſts of three hundred and ſixty-five days and ſix hours, being divided into twelve months of equal extent with thoſe of the Julian year, to which they correſpond. This year begins October 1, ſo that the month called Tiſhrim agrees with our October. The aſtronomical year is twofold, viz. the tropical and ſidereal: by the latter, is meant that ſpace of time which the ſun takes in departing from a fixed ſtar, and returning to the ſame again. This year conſiſts of three hundred and ſixty-five days, ſix hours, and ten minutes.

As the form of the year is various among different nations, ſo likewiſe is the beginning: the Jews began their eccleſiaſtical year with the new moon of that month whoſe full moon happens next after the vernal equinox; and every ſeventh year they kept as a ſabbatick year during which they let their land lie at reſt. The ancient Jewiſh year was made to agree with the ſolar year, by the adding of eleven, and ſometimes of twelve days, at the end of the year, or by an emboliſmick month.

The beginning of the Athenian or Attick year was reckoned from that new moon, the full moon of which comes next after the ſummer ſolſtice.

The Macedonian lunar year agrees with the Athenian, excepting that the former takes its beginning, not from the ſummer ſolſtice, but from the autumnal equinox.

The Ethiopick year is a ſolar year, agreeing with the actiack or fixed Egyptian year, except in this, that the names of the months are different, and that it commences with the Egyptian year, on Auguſt 29th of the Julian year.

The Arabian or Mahometan year is called alſo that of the hegira, becauſe the calculation of theſe years runs from the epocha of the hegira, when Mahomet fled from Mecca to Medina. They had twelve civil months in a year, which contained twenty-nine and thirty days, by turns, abating for their leap-years, in which the month Dulheggia has always thirty.

The Mahometans begin their year when the ſun enters Aries; the Perſians, in the month anſwering to our June; the Chineſe, and moſt of the Indians, begin it with the firſt moon in March.

At Rome, there are two ways of computing the year, the one beginning at the nativity of our Lord, which the notaries uſe; the other in March, on occaſion of the incarnation, and it is from this the bulls are dated.

In England, the civil or legal year, as well as the hiſtorical year, commences January 1, by the late act for the alteration of the ſtyle. The church, as to her ſolemn ſervice, begins the year on the firſt Sunday in Advent, which is always that next St. Andrew's day.

Julian YEAR, the year as it was corrected and ſettled by Julius Cæſar. See BISSEXTILE.

Gregorian YEAR, the tropical year as corrected by pope Gregory, and which is at preſent uſed in England. See BISSEXTILE.

YEAR *and* DAY, in law, ſignifies a certain time that by law determines a right, or works preſcription in divers caſes; as in the caſe of an eſtray, if the owner do not challenge it within that time, it becomes forfeited to the lord; ſo of a wreck, &c. The like time is given to proſecute appeals in; and where a perſon wounded dies in a year and a day after the wound received, it makes the offender guilty of murder.

YEARN, in hunting, ſignifies to bark, as beagles properly do, at their prey.

YELLOW, a bright colour, reflecting the moſt light of any, after white. See COLOUR and LIGHT.

There are divers yellow ſubſtances that become white, upon wetting, and drying them again ſeveral times at the ſun; as wax, linen-cloth, &c.

The ſame bodies, if they be already white, and continue a long time in the air without being wetted, turn yellow.

Paper and ivory applied near the fire, become ſucceſſively yellow, red, and black. Silk, when turned yellow, is whitened again with the fumes of ſulphur.

YELLOW, in dying, is one of the five ſimple and mother colours.

For the fineſt yellows, they firſt boil the cloth, or ſtuff, in alum and pot-aſhes; then give the colour with weld, or would.

Turmerick likewiſe gives a good yellow, though not the beſt. There is alſo an Indian wood that gives a yellow colour bordering on gold. A fourth ſort of yellow is made with ſavoury, but this is inferior to them all.

Greens are uſually made of yellow and blue mixed. With yellow, madder red, and goat's hair prepared with madder, are made the golden yellow, aurora, panſy, nacarate, iſabella, and chamois-colour; which are all caſts or ſhades of yellow.

Painters and enamellers make their yellow of maſſicot, which is ceruſs raiſed by the fire; or with yellow oker. Limners and illuminers make it with ſaffron, and French berries, orcanette, &c.

Brantom obſerves, it was anciently the cuſtom to paint a man's

a man's door yellow, and ſtrew his houſe with ſalt; to declare him traitor to his king.

YELLOWS, a diſeaſe in a horſe, much the ſame with that called jaundice in man.

There are two kinds of it, the yellow and the black.

The yellows is a very frequent diſorder, ſay the farriers, ariſing from obſtructions in the gall-pipe, or the little ducts opening into the ſame, occaſioned by viſcid or gritty matters lodged therein, or a plenitude and compreſſion of the neighbouring blood-veſſels; by means whereof, the matter that ſhould be turned into gall, is taken up by the vein, and carried back into the maſs of blood, which it tinctures yellow; ſo that the eyes, inſide of the lips, and other parts of the mouth capable of ſhewing the colour, appear yellow.

The effect whereof is, that a horſe will be dull, heavy, and low-ſpirited; eaſily jaded by the leaſt labour or exerciſe, &c.

YEOMAN, the firſt or higheſt degree among the plebians of England, next in order to the gentry. The yeomen are properly freeholders, who having land of their own, live on good huſbandry.

YEOMAN, is alſo a title of office in the king's houſhold, of a middle place or rank between an uſher and a groom.

YEOMEN *of the Guard*, were anciently two hundred and fifty men of the beſt rank under gentry, and of larger ſtature than ordinary, each being required to be ſix feet high. At preſent there are but one hundred yeomen in conſtant duty, and ſeventy more not in duty; and as any of the hundred dies, his place is ſupplied out of the ſeventy.

YERKING, in the menage, is when a horſe ſtrikes with his hind legs, or flings and kicks back with his whole hind quarters; ſtretching out the two legs nearly together, and even to their full extent.

YEST, YEAST, or BARM, a head or ſcum riſing upon beer or ale, while working or fermenting in the vat. It is uſed for a leaven or ferment in the baking of bread, as ſerving to ſwell or puff it up very conſiderably in a little time, and to make it much lighter, ſofter, and more delicate. When there is too much of it, it renders the bread bitter.

YEW-TREE, *Taxus*, in botany.

YEW, is alſo a term uſed by the ſalt-workers of Limington, and ſome other parts of England, to expreſs the firſt riſing of a ſcum upon the brine in boiling.

YIELDING *and paying*, a law phraſe, formed by corruption from the Saxon geldan, or gildan, to pay. Hence, in Domeſday, gildare is frequently uſed for ſolvere, reddere; the Saxon G being eaſily converted into a Y.

YNCA, YNCAN, or INCA, an appellation anciently given to the kings of Peru, and the princes of their blood; the word ſignifying, literally, lord, king, emperor, and royal blood.

The king himſelf was particularly called capack ynca, i. e. great lord. His wife, pallas, and the princes ſimply, ynca's.

Theſe ynca's, before the arrival of the Spaniards, were exceeding powerful. Their people revered them to exceſs, as believing them to be the ſons of the ſun, and never to have committed any fault. If any perſon offended the royal majeſty in the ſmalleſt matter, the city he belonged to was totally demoliſhed.

When they travelled, whatever chamber they lay in on the road, was walled up as ſoon as they departed, that no body might ever enter in after them. The like was done to the room wherein the king died; in which, likewiſe, all the gold, ſilver, and precious furniture were immured, and a new apartment built for his ſucceſſor.

His beloved wives, domeſticks, &c. likewiſe ſacrificed themſelves, and were buried alive in the ſame tomb along with him. See the hiſtory of the Yncas, by Garcilaſſo de la Vega.

YOAK, or YOKE, in agriculture, a frame of wood, fitted over the necks of oxen, whereby they are coupled together, and harneſſed to the plough.

YOAK *of Land*, in our ancient cuſtoms, was the ſpace which a yoak or a pair of oxen may plough in a day.

Sea-YOAK. When the ſea is ſo rough that the helm cannot be governed by the hands, the ſeamen make a yoak to ſteer by, that is, they fix two blocks to the end of the helm, and reeving two ſmall ropes through them, which they call falls, by having ſome men at each tackle, they govern the helm by direction. They have another way of making a ſea-yoak, by taking a double turn about the end of the helm with a ſingle rope, the ends being laid to the ſhip's ſides, by means whereof they guide the helm.

YOIDES, or HYOIDES, in anatomy, a bone ſituate at the root of the tongue, and compoſed of divers little bones, united by cartilages which ſometimes oſſify.

It is not contiguous to the extremity of any other bone, nor has any articulation with them: on which account, it is not ſhewn in the ſkeletons.

Its uſe is to fortify the baſe or root of the tongue, and facilitate the paſſage of the air into the trachea, and the food into the gullet. It has five pair of muſcles, which move it together with the tongue.

YOLK, or YELK, *Vitellus*, the yellow part in the middle of an egg. See EGG.

The chicken is formed out of and nouriſhed by the white alone, till it be grown to ſome bulk: after which, the yolk ſerves it for nouriſhment; which it likewiſe does, in part, after it is hatched. For a good part of the yolk remains after excluſion; being received into the chicken's belly; and being there reſerved, as in a ſtore-houſe, is by the ductus inteſtinalis, as by a funnel, conveyed into the guts, and ſerves inſtead of milk. *Willugh. Ornithol.* Lib. I. c. 3. This was even known to Pliny: Ipſum animal ex albo liquore ovi corporetur; cibus ejus in luteo eſt. Lib. X. c. 53.

YOUNG, in the army, that regiment, or officer, is ſaid to be the younger, junior, which was laſt raiſed, or whoſe commiſſion is of lateſt date, whatever be the age of the man, or however long he may have ſerved in other capacities.

YOUNKERS, among ſailors, are the younger ſailors, otherwiſe called foremaſt-men; whoſe buſineſs is to take in the top-ſails, furl the ſails, ſling the yards, &c.

YPSILOIDES, in anatomy, the third genuine ſuture of the cranium, thus called from its reſembling a Greek Υ upſilon.

YQUETAYA, in natural hiſtory, a plant in Braſil, long uſed as a medicine in that country; and lately diſcovered to the Europeans by a French ſurgeon.

It has been ſince found in France, where, being cultivated and examined by M. Marchant, it appears to be a kind of ſcrophulary, or blood-nettle.

It has this remarkable property, that it takes away from ſenna all its taſte and ſmell; which property of correcting the infuſion of ſenna, was unknown in the ſcrophulary.

To uſe this plant, it muſt be dried ten or twelve days in the ſhade, and afterwards expoſed to the ſun, till quite dry.

Z.

Z, The twenty-fourth and laſt letter, and the nineteenth conſonant of our alphabet.

It has been reputed a double conſonant, having the ſound d s; but ſome think with very little reaſon; and, as if we thought otherwiſe, we often double it, as in puzzle, muzzle, &c.

Among the ancients, Z was a numeral letter, ſignifying two thouſand; and with a daſh added at top $\bar{z}$, ſignified two thouſand times two thouſand, or four millions.

ZAFFER, or Zaffre, in chymiſtry, the name of a blue ſubſtance, of the hardneſs and form of a ſtone, and generally ſuppoſed to be a native foſſil.

It is in reality, however, a preparation of cobalt; the calx of that mineral being mixed with powdered flints, and wetted with water to bring it into this form. See Cobalt.

ZAIM, a portion of land, allotted for the ſubſiſtence of a horſe-man in the Turkiſh militia; called alſo timar.

ZAIRAGIA, or Zairagiah, a kind of divination in uſe among the Arabs; performed by means of divers wheels, or circles, placed concentrick to one another, and noted with ſeveral letters, which are brought to anſwer to each other, by moving the circles according to certain rules.

This is alſo called zaraiah, by reaſon the circles of this machine, which are called mutazariat, laflak, &c. correſpond to the orbs of the planets, and the atmoſpheres of the ſeveral elements.

ZAPATA, or Sapata, a kind of feaſt, or ceremony held in Italy, in the courts of certain princes, on St. Nicholas's day, wherein people hide preſents in the ſhoes or ſlippers of thoſe they would do honour to, in ſuch manner, as may ſurprize them on the morrow when they come to dreſs.

It is done in imitation of the practice of St. Nicholas, who uſed, in the night time, to throw purſes of money in at the windows, to marry poor maids withal.

F. Meneſtrier has deſcribed theſe zapatas, their origin, and different uſages, in his treatiſe des ballets anciens, & moderns.

ZEA, Indian corn, in botany, a genus of plants, producing male and female flowers in ſpikes; the corolla of the male flower is a bivalvular glume, with two compreſſed very ſhort nectaria: the ſtamina are three capillary filaments, topped with quadrangular antheræ; the corolla of the female flower conſiſts of two membranaceous broad, perſiſtent valves: there is no pericarpium; but the ſeeds, which are roundiſh and compreſſed, are half incloſed in a large long receptacle.

This corn is ground to flour, and the pooreſt ſort of people in America, Italy, and Germany, make their bread with it, and in ſome countries dreſs the ſpikes different ways: but this grain ſeldom agrees with thoſe who have not been accuſtomed to eat it. However, it is a better ſubſtitute than bean-flour, or other ſorts which have, in times of ſcarcity, been uſed in England; and will always be found a hearty food for cattle, hogs, and poultry: ſo that in light ſandy lands, where beans and peas ſucceed not well, this grain may be cultivated to advantage. The ſeaſon for ſowing the ſeed is the latter end of March, or beginning of April.

ZEAL, the exerciſe of a warm animated affection, or paſſion, for any thing. See Passion.

ZEALOTS, an ancient ſect of the Jews, ſo called from their pretended zeal for God's laws, and the honour of religion. The zealots were a moſt outrageous and ungovernable people; and on pretence of aſſerting God's laws, and a ſtrictneſs and purity of religion, aſſumed a liberty of queſtioning notorious offenders, without ſtaying for the ordinary formalities of law.

ZEBLICIUM, *Marmor*, in natural hiſtory, a name given by ſeveral authors to a ſoft green marble variegated with black and white; and though the authors who have deſcribed it have not obſerved it, yet it no way differs from the white ophites of the ancients.

ZEBRA, the wild aſs, in zoology, a ſpecies of equus, tranſverſely ſtriated.

The whole animal is party-coloured, or beautifully ſtriped in a tranſverſe direction, with long and broad ſtreaks, alternately of a deep, gloſſy, and ſhining browniſh and whitiſh, with ſome abſolutely black. It is a native of many parts of the eaſt.

ZECHARIA, a canonical book of the Old Teſtament, containing the predictions of Zechariah, the ſon of Barachia, and grandſon of Iddo. He is the eleventh of the twelve leſſer prophets.

ZEDOARY, in the materia medica, a root, the ſeveral pieces of which differ ſo much from one another in ſhape, that they have been divided into two kinds, as if two different things, under the names of the long and round zedoary, being only the ſeveral parts of the ſame root.

Zedoary, diſtilled with common water, affords a thick and denſe eſſential oil, which ſoon concretes of itſelf into a kind of camphire, and on this oil its virtues principally depend. It is a ſudorifick, and is much recommended by ſome in fevers, eſpecially of the malignant kinds. It is alſo given with ſucceſs as an expectorant in all diſorders of the breaſt, ariſing from a tough phlegm, which it powerfully incides and attenuates; it is alſo good againſt flatulencies, and in the cholick; it ſtrengthens the ſtomach and aſſiſts digeſtion; and, finally, is given with ſucceſs in nervous caſes of all kinds.

ZEND, or Zendavesta, a book containing the religion of the magicians, or worſhippers of fire, who were diſciples of the famous Zoroaſter.

This book was compoſed by Zoroaſter, during his retirement in a cave, and contained all the pretended revelations of that impoſtor.

ZENITH, in aſtronomy, the vertical point; or a point in the heavens directly over our head.

Or, the zenith is a point in the ſurface of the ſphere, from which a right line, drawn through the ſpectator's head, paſſes through the centre of the earth.

Hence, there are as many zeniths as there are different places on the earth, where the heavens may be ſeen; and upon the changing our place, we alſo change our zenith.

The zenith is alſo called the pole of the horizon, becauſe 90° diſtant from each point thereof.

It is alſo the pole of all the almucanturs, or parallels of the horizon, whereby the altitude of the ſtars is eſtimated.

Through the zenith paſs the vertical-circles, or azimuths.

The point diametrically oppoſite to the zenith, is called the nadir; which is the point directly under our feet.

The nadir is the zenith to our antipodes, as our zenith is the nadir to them.

Zenith-Distance, is the complement of the ſun's, or a ſtar's meridian altitude; or what the meridian altitude wants of 90°.

ZENSUS, in arithmetick, a name given to a ſquare number, or the ſecond power, by ſome authors.

ZEPHANIAH, a canonical book of the Old Teſtament, containing the predictions of Zephaniah the ſon of Cuſhi, and grandſon of Gedaliah; being the ninth

of he twelve lesser prophets. He prophesied in the time of king Josiah, a little after the captivity of the ten tribes, and before that of Judah; so that he was cotemporary with Jeremiah.

ZEPHYR, *Zephyrus*, the west wind; or that which blows from the cardinal point of the horizon opposite the east. See WIND and WEST.

ZEST, the woody thick skin, quartering the kernel of a walnut; prescribed by some physicians, when dried and taken with white-wine, as a remedy against the gravel.

Zest is also used for a chip of orange or lemon-peel; such as is usually squeezed into ale, wine, &c. to give it a flavour; or the fine etherial oil which spurts out of that peel on squeezing it.

ZETETICK METHOD, in mathematicks, the method made use of to investigate or solve a problem.

ZETA, or ZETECULA, a little closet, or withdrawing-chamber, with pipes running along the walls, to receive, from below, either the cool air, or the steam of warm water.

ZEUGMA, a figure in grammar, whereby an adjective, or verb, which agrees with a nearer word, is also, by way of supplement, referred to another more remote.

Thus Terence, Utinam aut hic surdus, aut hæc muta facta sit. So Virgil, Hic illius arma hic currus fuit. In which cases, the words facta sit, agreeing primarily with hæc muta, are also made to agree or extend to hic surdus: and the verb fuit, is not only referred to hic currus, which it properly respects, but further, to hic illius arma.

The Latins, it may be observed, take a liberty in construction, which some of the nicer criticks among the moderns, particularly the French, will not allow in the modern tongues.

ZIBETHICUS, the civet-cat. See CIVET.

ZIBETHUM, or ZIBETTA, in natural history, civet; a prefume like musk, contained in a kernelly bladder, in the groin of a civet cat.

ZIMENT-WATER, or copper-water, in natural history, the name by which some have called water found in places where there are copper-mines, and lightly impregnated with particles of that metal. See COPPER.

The most famous spring of this kind is a mile distant from Newsol, in Hungary, in a great copper-mine, where the water is found at different depths, and is received into different basons, for the purpose of separating the copper from it. In some of these it is much more highly sated with this metal than in others, and will make the supposed change of iron into that metal much sooner. The most common pieces of iron used in the experiments, are horse-shoes, nails, and the like; they are found very little altered in shape after the operation, except that their surfaces are more raised. The water which performs this wonderful operation appears greenish in the basons where it stands; but if a glass of it be taken up, it looks clear as crystal; it has no smell, but has a very strong vitriolick and astringent taste, insomuch, that the lips and tongue are blistered and scorched on tasting it. The miners use this water as a medicine; and whatever sickness they are seized with, they first attempt its cure with large doses of this water, which usually both vomits and purges them briskly; they also use it in disorders of the eyes. The copper produced from these waters are valued by the people much beyond any other copper, as being more ductile, and running easier in the fire. And from the several experiments made upon the water, the true nature of it may be easily understood. It contains a large quantity of the vitriol of copper, which it probably owes to a solution of that metal, by means of the acid of the common pyrites and water. When this is known, the effects are not difficult to be accounted for; there being no real change of one metal into another, but the true state of the case being that the particles of one metal are dissolved and carried away, and those of another metal deposited in their place; a water thus impregnated is a menstruum capable of dissolving iron, and in the solution of that metal becomes so weakened as to let go the copper it before contained in small parcels.

ZINDIKITES, a sect among the Mahometans, denominated from their leader Zindik, whom Grotius makes to be one of the magi, and a follower of Zoroaster.

The Zindikites believe no providence nor resurrection. They allow no other God but the four elements, and in this sense assert, that a man, being a mixture of those simple bodies, returns to God when he dies.

ZINK, a semi-metallick substance, which, more than all the others of that class, approaches to the nature of true metals. It is very heavy, and less hard than bismuth, and greatly less friable than either antimony or that mineral. It, in some measure, approaches to malleability, being ductile to a certain degree, though that a very limited one, especially when made warm. It is very little susceptible of rust; and though in itself is not sonorous, yet, in mixture with other metals, it renders them much more so than they were before. It melts with a very small degree of fire, and if urged by a heat a little more intense, it flies wholly off in fumes. If these fumes are preserved, they are found to form a peculiar sort of flowers, not easily reducible into zink again. Zink is of a blueish white colour, very elegant, and much approaching to that of silver; and though it wants somewhat of the bismuth, yet it has that loss amply made up to it, in its more metalline appearance. If burnt away in an open fire, it yields a flame of a beautiful green colour. It melts very readily with lead and tin, and renders both of them the less malleable, in proportion, as it is mixed in a larger proportion with them. It may also be mixed in fusion with copper and iron; but when mixed with these, or any other of the metals that do not melt easily, caution must be used that the degree of fire necessary to fuse them do not burn away. For this purpose, the metals should be made into thin plates of filings, and be heated red-hot in a crucible, before the zink is added; and as soon as this is done, the fire should be made very brisk immediately, and the operation ended with all possible expedition.

Zink, mixed in this manner, with four times its weight of copper, makes a very beautiful yellow metal, called by us Bath metal, and prince Rupert's metal; which, if its malleability equalled the beauty of its colour, would be a very valuable composition. Zink has also this peculiar quality, that when urged by a large fire in mixture with the other metals, it does not go off alone, but carries up a great part of them, also, in form of flowers. This is the origin of pampholyx, tutty, and the cadmia fornacum, which are principally procured from the furnaces where copper and calamine, which is the ore of zink, and acts only as zink on these occasions, are melted together.

Zink is soluble in aqua regia, and other of the stronger acids. It is to be chosen the heaviest and brightest coloured that can be found, and such as will not extend under the hammer; for the people who sell it sometimes have the dishonesty to mix lead among it; but this is discovered by the too great degree of malleability it gives to it.

The ores of zink have, till very lately, been but little known. The principal of them, indeed, has been well known for many ages, as a fossile substance of use in medicine; but though it was found to have the same effect on copper as zink, and in the fire, if kept in close vessels, to sublime in the same sort of flowers; yet it did not occur, of a long time, to any body to suspect that these two substances belonged in any manner to one another. The ore we mean is the common lapis calaminaris, or calamine, which, as it is known by a peculiar appellation, and is famous for many virtues independent of the zink it contains, we have treated of under its common name. See CALAMINE.

ZIZIPHUS, a name sometimes given to a kind of fruit, more usually called jujub. See JUJUBES.

ZOCCO, ZOCCOLO, ZOCLE, or SOCLE, in architecture, a kind of stand or pedestal, being a low square piece or member, serving to support a busto, statue, pedestal, &c.

ZODIACK, *Zodiacus*, in astronomy, a fascia, or broad circle, whose middle is the ecliptick, and its extremes two circles parallel thereto, at such a distance from it, as to bound the excursion of the planets.

The zodiack, on the globe, is marked with the characters of the twelve signs, which are these; ♈ ♉ ♊ ♋ ♌ ♍ ♎ ♏ ♐ ♑ ♒ ♓; and in it is found out the sun's place, which is under what star or constellation he appears to be at noon.

By this are determined the four quarters of the year; and

and accordingly it is divided into four parts, and as the fun goes on here, he hath more or lefs declination north and fouth.

Alfo, from the middle of this circle, the latitudes of the planets and fixed ftars are accounted from the ecliptick towards its poles. And thofe poles are 23 degrees 30 minutes diftant from the poles of the world, or of the equinoctial; and by their motions are the polar circles defcribed.

In thefe poles all the circles of longitude, which are drawn through the zodiack, terminate (as the meridians and hour-circles do in the poles of the world) and as the azimuth circles do in the zenith and nadir.

The breadth of this circle, or rather zone, in the heavens, is 20 degrees; for beyond 10 degrees north, or 10 degrees fouth, the latitude of no planet ever reaches.

It feems to have been divided into 12 parts (which they call figns) becaufe, while the fun in a year's time is running through the zodiack or ecliptick, there happen to be 12 lunations; or the moon undergoes all her changes and phafes 12 times, pretty near. Each fign is divided into 30 degrees, fo that the whole makes 360: and they begin to reckon at the eaftern interfection of the equinoctial and ecliptick, or at the vernal equinox, where they place the firft point of Aries; going on thence to Taurus, Gemini, Cancer, &c. and when you count thus forward on, according to the ufual order and courfe of the figns, they call it, in confequentia; but if you count backwards from Taurus to Aries, &c. they fay, it is in antecedentia.

The reafon of the name of this circle, and its origin, was this:

The ancient aftronomers obferved the fun in his apparent annual motion to defcribe always one and the fame line or track in the heavens, and never to deviate from this path either to the north or the fouth, as all the other planets they found did more or lefs. And becaufe they obferved the fun to fhift as it were backwards, through all the parts of this circle or path, fo that in his whole year's courfe he would rife, culminate, and fet with every point of it, they diftinguifhed the fixed ftars, which appeared in or near this circle, into 12 conftellations or divifions, which they called figns, becaufe they were marks to diftinguifh whereabout the fun was. Thefe figns they painted ufually in the form of animals, and thence came the word zodiack; and the very middle of it is called the ecliptick, becaufe the eclipfes only happen when the moon is alfo in that line.

Ancient tradition has handed down to us the ingenious method which the firft men made ufe of, to know exactly the line which the fun defcribes under the heavens in the perpetual changings of its place, and to divide the year into equal portions. This tradition is found in two ancient authors, the one Roman, the other Greek. The firft attributes it to the Egyptians; the other, to the firft inhabitants of Chaldea.

They every day faw the fun and the whole heavens turning and paffing from eaft to weft. In the mean time they obferved that the fun, by a motion peculiar to it, from day to day receded from fome certain ftars, and took its place under others, always advancing towards the eaft. Whilft the moon was making twelve times that revolution, the fun made it only once; but fhe began the thirteenth again, before the fun had as yet compleated its own. The habit of dividing the year into pretty near twelve lunations, made them wifh that they had twelve divifions of a year perfectly equal, or twelve months, which might be exactly equivalent to the year itfelf, and which might, as it were, be pointed at with one's finger in the heavens, by fhewing fome certain ftars under which the fun paffes during every one of thefe months. Here is then the method in which they divided the courfe of the fun in twelve equal portions or collections of ftars, which are called afterifms or conftellations. Our aftronomers took a couple of brafs open veffels, the one pierced at the bottom, and the other without any orifice below. Having ftopped the hole of the firft, they filled it with water, and placed it fo as that the water might run out into the other veffel, the moment the cock fhould be opened. This done, they obferved in that part of the heaven, where the fun has its annual courfe, the rifing of a ftar, remarkable either for its magnitude or brightnefs; and at the critical inftant it appeared on the horizon, they began to let the water flow out of the upper veffel into the other during the reft of the night, and the whole following day, to the very moment when the fame ftar being come to the eaft again, began to appear anew on the horizon. The inftant it was again feen, they took away the under veffel, and threw the water that remained in the other on the ground. The obfervers were thus fure of having one revolution of the whole heaven, between the firft rifing of the ftar and its return. The water, which had flowed during that time, might then afford them a means of meafuring the duration of one whole revolution of the heaven, and of dividing that duration into feveral equal portions; fince, by dividing that water itfelf into twelve equal parts, they were fure of having the revolution of a twelfth part of the heaven during the efflux of a twelfth part of the water: they then divided the water of the under veffel into twelve parts perfectly equal, and prepared two other fmall veffels capable of containing exactly one of thofe portions, and no more. They again poured into the great upper veffel the twelve parts of water all at once, keeping the veffels fhut. Then they placed under the cock, ftill fhut, one of the two fmall veffels, and another near it to fucceed the firft, as foon as it fhould be full.

All thefe preparations being ready, they, the next night, obferved that part of the heaven towards which they had for a long while remarked that the fun, the moon, and the planets, took their courfes, and ftaid for the rifing of the conftellation, which is fince called Aries. The Greeks, perhaps, gave that name to fome ftars different from thofe which went by it before the flood: but this enquiry is not neceffary at prefent. The inftant Aries appeared, and they faw the firft ftar of it afcending, they let the water run into the little meafure. As foon as it was full, they removed it, and threw the water out. In the mean time they put the other empty meafure under the fall. They obferved exactly, and fo as to remember very well, all the ftars that rofe during all the periods which the meafure took in filling; and that part of the heaven was terminated in their obfervations by the ftar which appeared the laft on the horizon, the moment the meafure was juft full; fo that, by giving the two little veffels the time neceffary to be alternately filled to the brim three times each during the night, they had, by that means, one half of the courfe of the fun in the heaven, that is, one half of the heaven itfelf; and that half, again, was divided into fix equal portions, of which they might fhew and diftinguifh the beginning, the middle, and the end, by ftars, which, from their fize, number, or order, were rendered diftinguifhable. As to the other half of the heaven, and the fix other conftellations which the fun runs over therein, they were forced to defer the obfervation of them to another feafon. They ftopped till the fun, being placed in the middle of the now known and obferved conftellations, fhould leave them at liberty to fee the other during the night.

Doubtlefs, fome precautions are neceffary, not to miftake as to the fall of the water, which muft flow more flowly, in proportion as its mafs is lefs high. However, after having by this, or fome fuch means, made themfelves fure of the great annual courfe, which the fun faithfully follows in the heavens, and of the equality of the fpaces filled by the twelve collections of ftars that limit that courfe, the obfervers thought of giving them names. They in general called them the ftations or the houfes of the fun, and affigned three of them to each feafon. They then gave each conftellation a peculiar name, whofe property did not only confift in making it known again to all nations, but in declaring, at the fame time, the circumftance of the year (which was of concern to mankind) when the fun fhould arrive at that conftellation.

By a particular care of providence, the dams of the flocks commonly happen to be pregnant about the end of autumn. They bring forth during the winter, and in the beginning of the fpring. Whence it happens that the young ones are kept warm under the mother during the cold, and, afterwards, eafily thrive and grow active at the return of heat. The lambs come the firft, the calves follow them, and the kids fall the laft. By this means the lambs, grown vigorous and ftrong, may follow

follow the ram to the fields, as the fine days come on. Soon after the calves, and at last the kids venture abroad, and, by increasing the flock, begin to augment the revenues of their master.

Our ancient observers, seeing that there were, during the spring, no productions more useful than lambs, calves, and kids, gave the constellations, under which the sun passes during that season, the names of the three animals which enrich mankind most. The first was named Aries, the second Taurus, the third the two kids (Gemini) the better to characterize the fecundity of goats, which more commonly bring forth two young ones than one, and an abundance of milk more than sufficient to nourish them.

The bulk of mankind had already very often remarked, that there was a point to which the sun raised itself in its coming towards them, but which it never exceeded; and that it afterwards sunk daily, in receding from them for six months together; till it arrived at another point a great way under the first, but below which it never descended. This retreat of the sun, made very slowly, and always backward, gave the observers the occasion of distinguishing the stars, which follow the two kids, or Gemini, by the name of the animal that walks backward, viz. the crab. When the sun passes under the next constellation, it makes our climate feel sultry heats, but chiefly the climates where men were at that time all gathered together. When poets attribute to that constellation the fierceness and raging of the lion, of which it bears the name, it is very easy to guess at what might determine that choice from the beginning. Soon after, the housing of the hay and the corn is entirely over throughout the east, there remain on the ground only a few ears scattered here and there, which they caused to be gleaned by the least necessary hands: this work is left to the youngest girls. How then could they represent the constellation under which the sun sees no longer any crops on the ground, better than by the name and figure of a young maid a-gleaning? The wings you see her have in the spheres are ornaments added of later date, after the introduction of fables. The virgin, which follows the lion, is certainly no other than a gleaning girl, or, if you will, a reaper; and, lest we should mistake her functions, she besides has in her hand a cluster of ears: a very natural proof of the origin here attributed to her.

The perfect equality of days and nights, which happens when the sun quits the sign Virgo, caused astronomers to give the next sign the name of Libra, that is, of a balance. The frequent diseases which the sun leaves behind him, or causes by his retiring, procured the next sign the name of Scorpio; because it is mischievous, and drags after it a sting and venom. Towards the end of autumn, the fall of the leaf exposes wild beasts, leaving them less covering: vintage and harvest are over: the fields are free, and it is of ill consequence to suffer the propagation of beasts at the approach of winter. Every thing then invites us to hunt, and the sign, in which the sun is at that time, has from thence obtained the name of Sagittarius; that is, the archer or huntsman.

What is the proper and distinctive character of the wild goat, or Capricorn, of which the first sign of winter has the name? It is to look for its food, getting from the foot of the mountains to the highest summit, and always climbing from rock to rock.

The name of Capricorn was then fit to inform men of the time when the sun, having reached the lowest verge of its course, was ready to begin to ascend again towards the highest, and to continue to do so for six months together. This is quite the reverse of the crab (Cancer); and the happy concurrence of the opposite characters of these two animals, is a proof of what directed the first observers in the imposition of all these names.

Aquarius and Pisces, without any difficulty, mark out the rainy season, and the time of the year when fishes, fatter and nicer than in any other time, bring on again the profit and pleasure of fishing.

It may be remarked, that of the twelve constellations, there are ten, the names of which are borrowed from several animals; which caused astronomers to give the annual circle, which they compose, the name of Zodiack. It is as much as if you should say, the circle of animals.

By this very plain industry, men acquired a new method of measuring time, and of regulating all their works. They already knew, without any trouble or care how to regulate the order of their feasts and common business, by inspection only of the phases of the moon. From the knowledge of the zodiack, they obtained an exact knowledge of the year: the constellations became to them so many very significant signs, which, both by their names and respective situations, informed them of the order of their harvests, and of the cautions they were to take, in order to bring them about, openly and daily shewing them, how long they were to stay for them: the people were neither obliged to cast up the days, or mark out the order of times to regulate themselves. Twelve words applied to twelve different parts of the heaven, which every night revolved before their eyes, were to them a part of knowledge no less convenient and advantageous, than easy to be acquired. When men, after the setting of the sun, saw the stars of the sign Aries ascend the opposite horizon, and distant from the sun by one half of the heaven, they then knew that the sun was under the sign Libra, which, being the seventh of the celestial signs, was distant from the first by one whole half of the zodiack. When at the approach of day they saw in the middle of the heaven, and at an equal distance from east and west, the finest star of the sign Leo, they easily understood that the sun, then ready to rise, was at the distance of three signs from Leo, and removed towards the east one quarter part of its circle. Thus, without seeing the stars which the sun drowned by its brightness as he came under them, they said with a perfect assurance, that the sun is now in Scorpio; two months hence we shall have the shortest day. They could, on sight of a single constellation, placed in the eastern, or middle, or western part of the heaven, immediately say where the sun was, how far the year was advanced, and what kind of work it was fit they should busy themselves about. After this manner shepherds and farmers still regulate their works; and if we at present are now ignorant of the stars, if we are not able to determine the distance between one constellation shewn us, and the actual place of the sun, it is because we can read and write. The first men perused the heavens for want of writing; and is on account of the conveniency of writing, that the generality of men now dispense with looking among the stars, for the knowledge of the operations and order of the year. But writing itself, that so useful invention, is one of the products of astronomy; and it may be easily shewn also, that the names, given the twelve celestial signs, gave birth to the invention both of painting and writing. The history of the heavens promises a very agreeable novelty, and it will continue to inform us of the helps, for which we are indebted to the study of nature.

ZODIACK *of the Comets*. Cassini hath observed a certain tract in the heavens, within whose bounds (by many observations) he found most comets, though not all, to keep. This he makes as broad as the other zodiack, and marks it with signs or constellations like that; which are Antinous, Pegasus, Andromeda, Taurus, Orion, the lesser Dog, Hydra, the Centaur, Scorpion, and Sagittary.

ZONE, in geography and astronomy, a division of the terraqueous globe, with respect to the different degrees of heat found in the different parts thereof.

There are five Zones. One of which is called the torrid zone, and is that space, or track of the earth which is comprehended between the two tropicks. The ancients imagined this track of the earth to be uninhabitable, on account of the heat of the sun there. There are two frigid zones, the one is that portion of the earth's surface which is included within the arctick circle, the other within the antarctick. The remaining two are the temperate zones, lying on one side the equator, and the other on the other, between the frigid and the torrid ones.

ZONNAR, a kind of belt, or girdle of black leather, which the Christians and Jews of the Levant, particularly those in Asia, and the territories of the grand seignior, are obliged to wear; to distinguish themselves from the Mahometans.

It was Motavakkel X. kaliph of the family of the Abassides, that first enjoined the Christians to wear the zonnar. The ordinance to this effect was published in the year of the Hegira 235.

Hence

Hence, as most of the Christians of Syria, Mesopotamia, &c. are either Nestorians, or Jacobites; those sectaries are often called Christians of the girdle.

ZOOLOGIA, ZOOLOGY, a discourse or treatise upon animals, or living creatures.

Zoology makes a considerable article in natural history; comprehending what relates to the form, structure, method of living, feeding, propagating, &c. of the divers species of brute creatures.

ZOPHORICK COLUMN, a column that supports the figure of an animal.

ZOOPHORUS, or ZOPHORUS, in the ancient architecture, the same thing with the frieze in the modern.

It was thus called in Greek, because anciently adorned with the figures of animals, from ζωον, animal, and φερω, I bear. The Greeks sometimes also call the zodiack, zophorus, because of the signs and constellations therein.

ZOOPHYTON, ZOOPHYTE, in natural history, a kind of intermediate body, partaking both of the nature of a sensitive and a vegetable.

Such is the planta pudica commonly supposed to be, though with little foundation. The ancients also reputed sponges to be zoophytes.

The fœtus, while in the womb, appears to be a real zoophyte, growing to the mother by the funiculus umbilicalis, as plants do to the earth by their stem.

Olearius mentions a very extraordinary sort of zoophyte, called agnus Scythicus, or borametz, growing near Samara on the Volga. It is a kind of melon shaped like a lamb, all the parts whereof it has, and grows to the earth by a stem, which serves it for a navel-string. As it grows, it changes place as much as its stem will allow of; and it consumes and dries up all the grass where it grows. When ripe, the stem withers, and the body, or fruit, becomes covered with a downy skin, which may be dressed and used as fur.

Olearius was shewn some of this skin, taken off the covering of a bed, which the people swore came from the fruit: it was covered with a soft curled wool, like that of a young lamb. Scaliger adds, that this fruit lives, and grows, till such time as it wants grass.

ZOOTOMY, the art or act of dissecting animals, or living creatures.

Zootomy amounts to the same with anatomy, or rather comparative anatomy.

ZOPISSA, a naval pitch, or that scraped off from the sides of ships that have been a long time at sea. It is a composition of pitch and tar, impregnated by the salt of the sea; and is used in external applications as a resolutive and deficcative.

ZUINGLIANS, a branch of the ancient Christian Reformers, or Protestants, so called from their author, Huldrick Zuinglius, a divine of Switzerland; who, soon after Luther had declared against the church of Rome, and being then minister of the church at Zurich, fell in with him, and preached openly against indulgences, the mass, the celibacy of the clergy, &c.*

ZYGOMA, in anatomy, a bone of the head, otherwise called os jugale.

The zygoma is no single bone, but an union or assemblage of two processes, or eminences of bones; the one from the os temporis, the other from the os malæ.

These two eminences, or apophyses, are joined together by a suture, thence called zygomaticus.

ZYGOMATICUS MUSCULUS, in anatomy, is a muscle which comes from the zygoma, and, passing obliquely, is inserted near the angle of the lips. It helps to draw the lips obliquely upwards.

ZYGOMATICUS, is also an epithet applied to the suture which joins the two processes of the zygoma together.

ZYMOSIMETER, an instrument proposed by Swammerdam, in his book de Respiratione, to measure the degree of fermentation, occasioned by the mixture of different bodies, and the degree of heat they acquire in fermenting; as, also, the heat or temperament of the blood of animals.

ZYTHOGALA, a term frequently met with in Sydenham, signifying a posset-drink, or a mixture of beer and milk.

ZYTHUM, or ZYTHOS, a sort of malt liquor, in use among the ancient Germans.

Matthiolus represents the ancient zythum, and curmi, as the same with our beer and ale.

* For a more particular account of ZUINGLIUS and his followers, see his life in the BIOGRAPHIA EVANGELICA, just published by the Rev. *Erasmus Middleton*, and sold in numbers, (price six-pence, with an elegant engraving in each number) or the volume may be had complete, (price six shillings) by the publisher of this work, and by the author, Printing-house-yard, Black-Friars.

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